El Mundo ante el Cenit del Petróleo

INFORME SOBRE LA CÚSPIDE DE LA PRODUCCIÓN MUNDIAL DE PETRÓLEO

aeren
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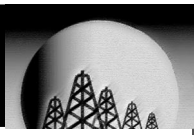
HOW IS OIL FORMED?

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.)



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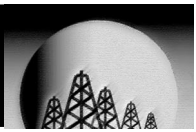
This article was conceived as a contribution to inform the global energy crisis in which we find ourselves. The references quoted at the end are suggested to enable more information to be sourced, in addition to the plentiful updated information avail able in the web www.crisisenergetica.org, where there is also a debate forum, links to related pages, and the monthly bulletins of the Association for the Study of Peak Oil (ASPO). This has been formed by scientists from many countries who study the oil reserves, and who try to determine the date and the impact of world oil and natural gas production's peak.

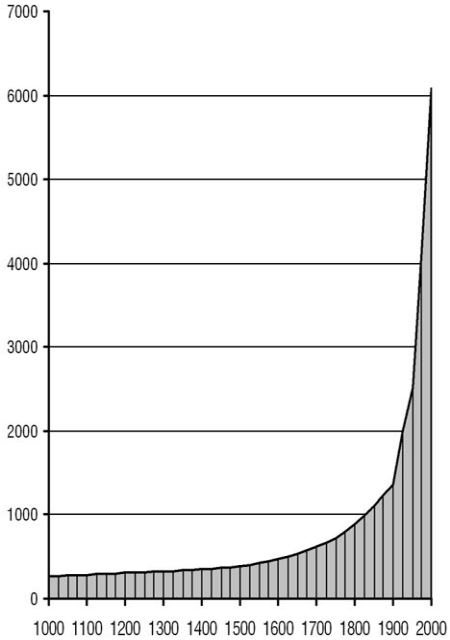
Introduction



Oil is a unique resource which constitutes for humanity a very efficient, easy to extract, transport and use source of energy, as well as a raw material to obtain a big amount of materials. The plentiful availability of oil has been decisive in the deep changes that humanity has experienced in the last century, reaching the state of dependence on "black gold" in which today's world is, since it is present in almost everything we use and it is the energy source that powers 95 % of world transport.

Oil has also been essential in the increase in the capability to produce and distribute food worldwide and in the advances achieved in medicine, contributing to the world population explosion, from 1,000 million human beings at the middle of the 19th century to about 6,500 million today.

It is estimated that humanity has consumed, in only one hundred years, almost half of the initially existing oil, which needed millions of years to form in the subsoil of many areas of our planet. Several studies are advising from some decades ago that, once half of the planet's oil reserves are consumed, the pace of extraction would begin to decline.

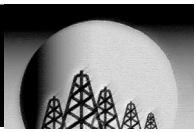


Evolution of world population in thousands of millions of inhabitants from year 1000 to 2000.

That means that at the beginning of the 21st century, mankind faces a reduction in the availability of the most essential resource which enables the present economic system and way of life, and possibly constitutes the biggest challenge which present society faces, as no other known resource with its qualities and provisions exists. In spite of the investment carried out, there are no substitutes that can replace it as an energy source, especially to power fuel for transport, or as a raw material for the more than three thousand products for common use that are obtained from oil.

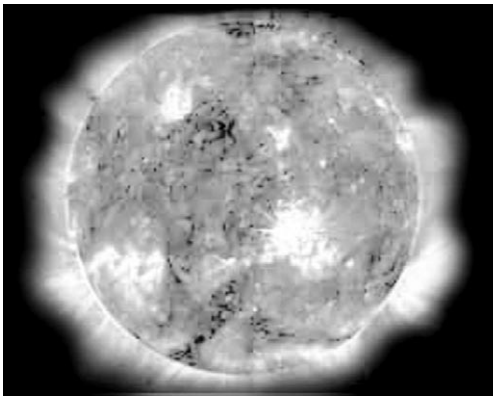
A gradual decrease in the surplus production of oil has been taking place in the last years, due to difficulties in increasing the supply at the same pace as demand, so oil prices have increased significantly. It is possible that this process will become more pronounced in coming years, especially at the point when oil production begins to decrease. The rise in energy costs and the lack of supply could lead the world economy to an unprecedented recession, the first signs of which are becoming more and more noticeable.

1.



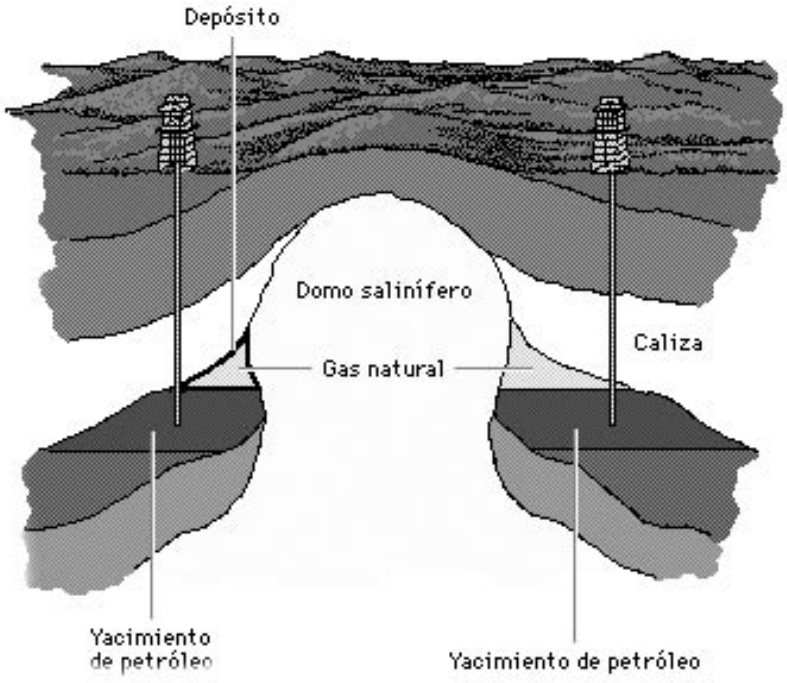
Fossil fuels, energy crisis and climatic change

The energy displayed in our planet, whether it is that which gives way to the movement of the air and the oceans, to the clouds and the rain, or that shows itself in the form of life, 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 directly or indirectly.



Over millions of years, part of the energy absorbed in this way by human beings has been remaining buried in the form of organic matter and has been turning slowly, through physical-chemical processes, into diverse solid (coal), liquid (oil) and gaseous (natural gas) organic compounds.

These compounds, called "fossil fuels", are finite and non renewable, as they need millions of years to be formed, and they are unique in Nature, since no other elements formed in that way exist and which, therefore, accumulate an amount of energy so large, easy and immediate to use, by mere combustion.



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 violently through the drilled hole. (Source: Encarta Enclyclopedia 2002)

(NOTE: This box has been translated from the Spanish Encarta Encyclopaedia, but if you´ve got it in English, it´d be better to copy it from it in English)

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

So it can be said that what our species is doing by burning massive quantities of fossil fuels, is to move tons of high-carbon organic matters in the form of gases into the atmosphere, which have been 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 fishing resources. This made possible the demographic explosion of the last century and the way of life based on the high energy consumption which about one third of world population enjoys.

Fossil fuels are still the 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 and drains are also limited. That means that 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.

And this is precisely the point where we have reached: **while humanity keeps growing in population and energy needs, geologists advise that the supply of fossil fuels will begin to decline –beginning with oil and natural gas- and climatologists advise that the growth detected in the concentrations of the**

gases that result from their combustion has no precedent, at least in the previous hundreds of thousands and probably in millions of years (figure 1, below). Carbon dioxide (CO2) stands out among the gases whose concentration is noticeably increasing. This gas has the quality to act as a "greenhouse", what could be initiating an unpredictable alteration to the climatic balance of our atmosphere.

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 have to adapt to live with less and less energy available and materials derived of fossil fuels; also, the impact on world climate of such a large accumulation of certain greenhouse gases in the low layers of the atmosphere.

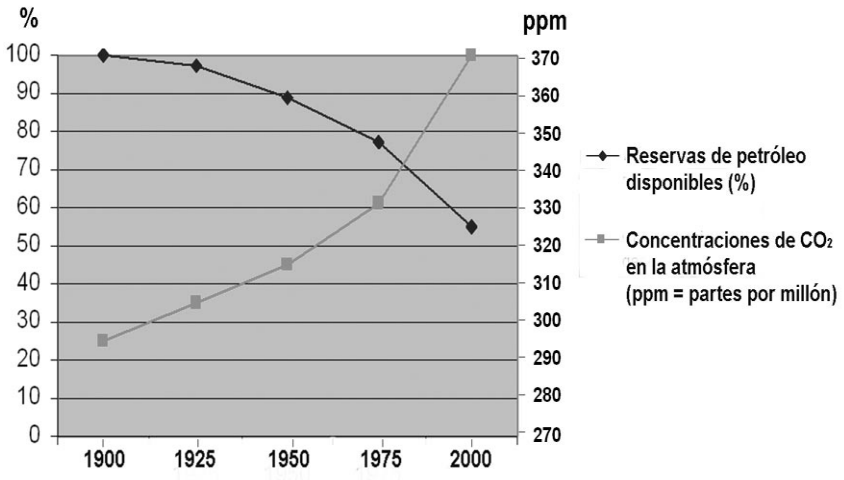


Figure 1: Rough evolution of the percentage of oil reserves and carbon dioxide (CO2) concentrations in the atmosphere during the 20th century.

2.

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 this made possible the growth of worldwide production and trade, but also lead to a significant dependence on energy and products coming from oil.

Our present society and lifestyle are possible thanks to intensive use of oil, since fundamental activities such as industry, electric production, transports, construction, tourism, agriculture, fishing, cattle farming, mining, medicine, etc., 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, eight calories average of fossil fuels, basically oil, are required per each calorie of food that reaches the final consumer.

Oil forms part of all forms of plastics, chemical products, building industry materials, etc. 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 fibres for clothing, furniture, bottles, nappies, computers, cameras, batteries, glasses, contact lens, shampooes, mobile telephones, toothpastes, ball pens, tyres, etc.

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 defence services, police, etc.

Therefore, it should not be surprising that any variation in oil's price affects all economic sectors and activity.

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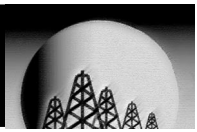


Hubbert´s curve

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

It shows that, although oil production increases quickly when the exploitation is initiated, so that more and more oil can be gradually extracted with very 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.

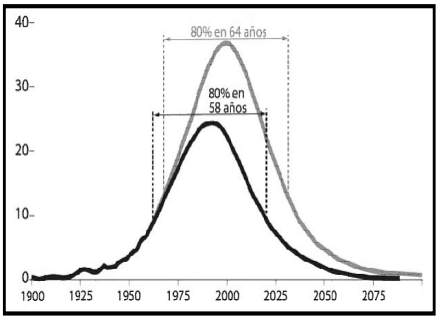
In the ascending stretch of Hubbert's curve (before reaching the peak), oil is plentiful, of high quality and easy to extract, but in the descending stretch it is more and more scarce, difficult to extract, of poorer quality and less pure.

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

If the evolution of any oil well's production shows a bell curve, logically, if the productions 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, also shows an evolution in the shape of a bell.

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 its oil production would be reached about 1970 (figure 6, page 18). For global production, Hubbert estimated that the peak would take place at the end of the 20th century or at the beginning of the 21st century, and he also proved that if world reserves exceed by one and a half his estimate, the world peak would be delayed only eight years

(figure 2, page 14).



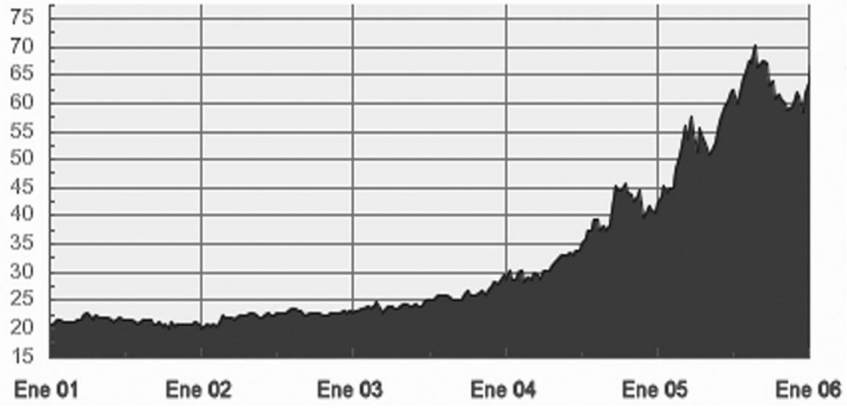
Several studies have verified the validity of Hubbert's results and show that about half of the initial oil reserves have already been consumed, which proves that we are in the period of worldwide oil production's peak.

Thus, although it is estimated that there is 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 the decline of it.

The descent of the worldwide supply of "black gold", against a background of increasing demand, together with the strong dependence on oil, and without any other energy alternatives that can replace the large amount of energy that it supplies within a short period of time, can open a gap between demand and supply that becomes deeper and deeper, and can lead to shortages in international markets and to a rise in oil prices.

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 be generated.



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

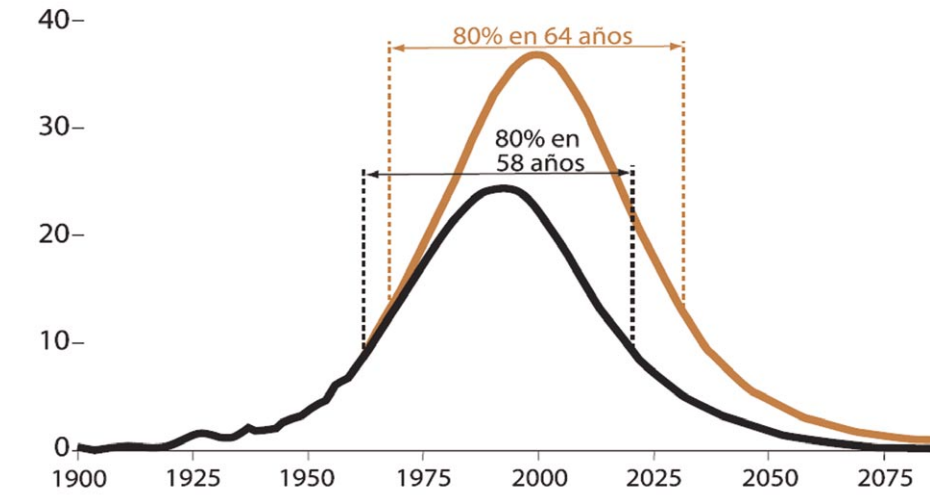


Figure 2: Projection of world oil production published by Hubbert in 1971 in "Scientific American". The upper curve shows that, although the reserves are doubled, the peak's date would be delayed only a decade, and the time invested by humanity in consuming 80% of all the world reserves would extend over 6 years only.

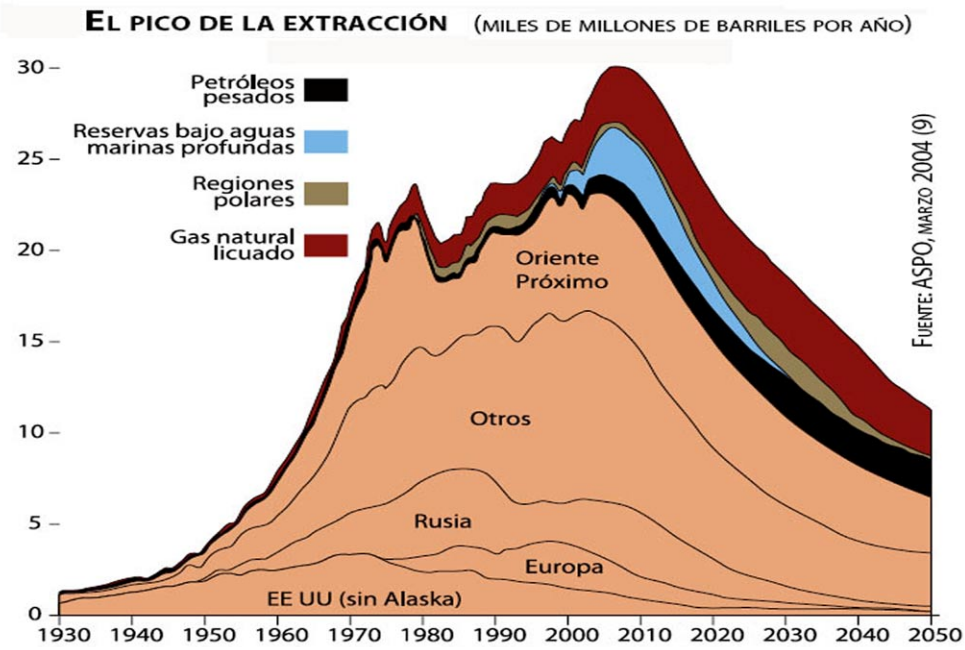


Figure 3: Graphic of world oil production according to the Association for the Study of Peak Oil (ASPO). Source: "Hubbert's Peak: The Impending Oil Shortage". Kenneth S. Deffeyes.

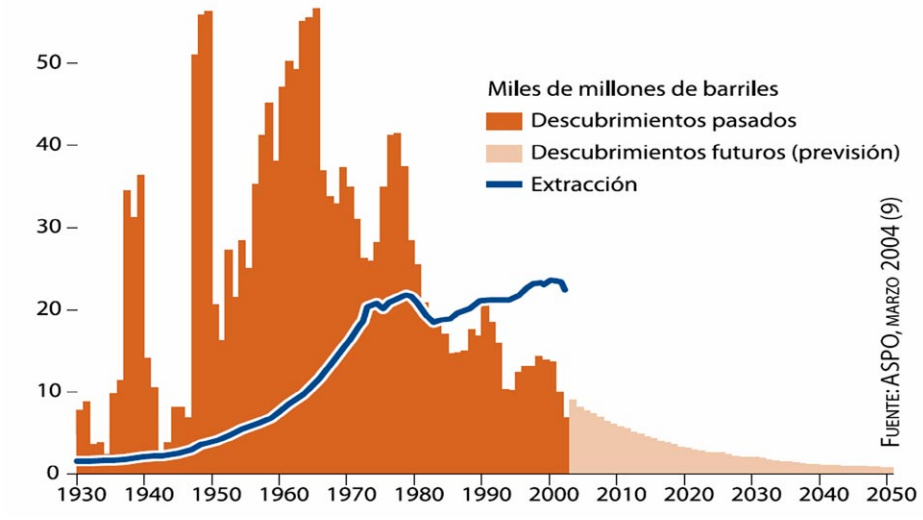


Figure 4: Annual discoveries of oil fields since 1930, given in volume of reserves included per year (vertical bars) and world oil extraction until year 2003 (blue curve). It can be observed that since the eighties oil extraction begins to exceed the oil discovered every year.

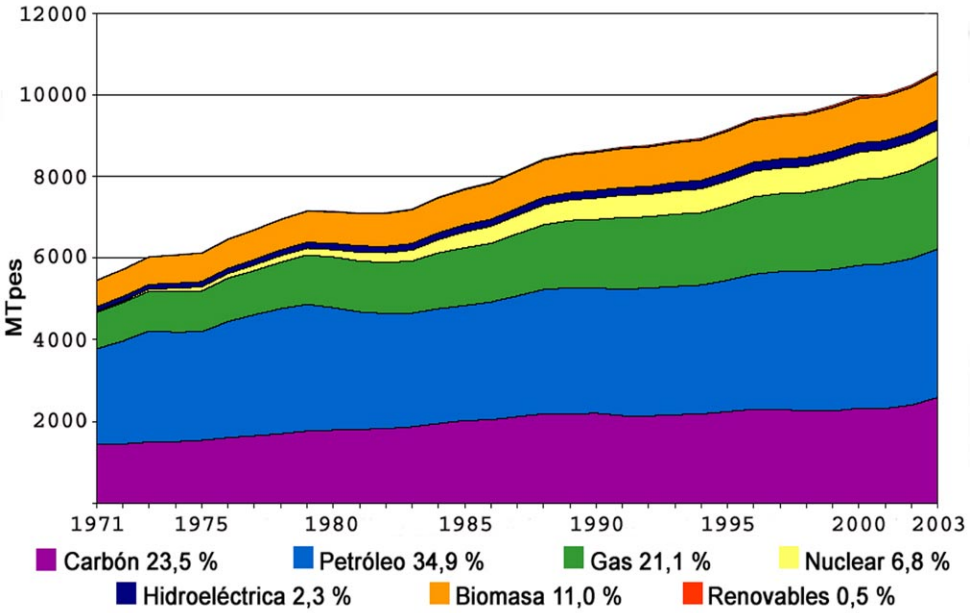


Figure 5: evolution of each primary energy source's supply over total world consumption from 1971 to 2003 in equivalent millions of tons of oil (MTpes). There are indicated the percentages supplied by each of them in 2000. / Source: International Energy Agency..

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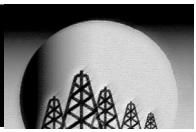
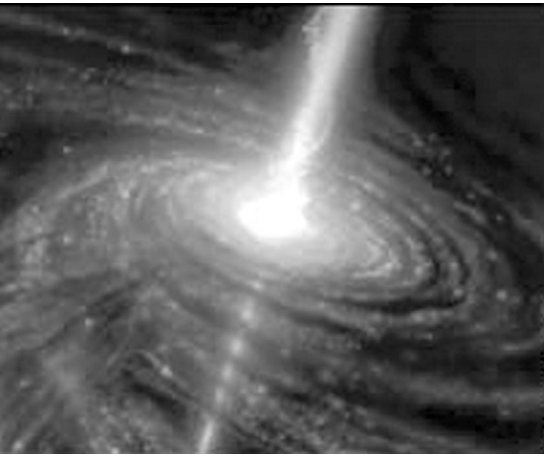


Reaching the peak of world oil production

It is not possible to know exactly the date of world oil production's peak, but almost all of the current most reliable estimates put it between 2004 and 2010.

(Figure 3, page 14).

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, and in any case the tendency expected for coming years is that it will begin to decline.



Actually, 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 plateau with many maximum peaks. The reserves of the OPEC (Organization of the Petroleum Exporting Countries) main

producer countries are not known with accuracy, either, which could be less than the ones officially published by their governments, since in the 80's, they increased them, with no scientific basis, to try to get larger annual production instalments, which were assigned according to the reserves reported by each country.

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

At the Conference on Peak Oil, of 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 of 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 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 soon.

It must be pointed out that demand, far from decreasing, has strongly increased in recent years, especially due to the significant economic growth of countries like China and India, whose populations amount to 2,300 million people.

More and more information and studies on the energy crisis appear, as well as comments by people connected to the energy and oil world, who alert us to the situation in which we find ourselves and of the consequences of rise in oil prices.

For example, the U.S. oil company Chevron-Texaco has recently began a campaign through the web Will You Join Us?, which 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.***

Many of the main fields and producer countries have gone into decline. When an exporter country's

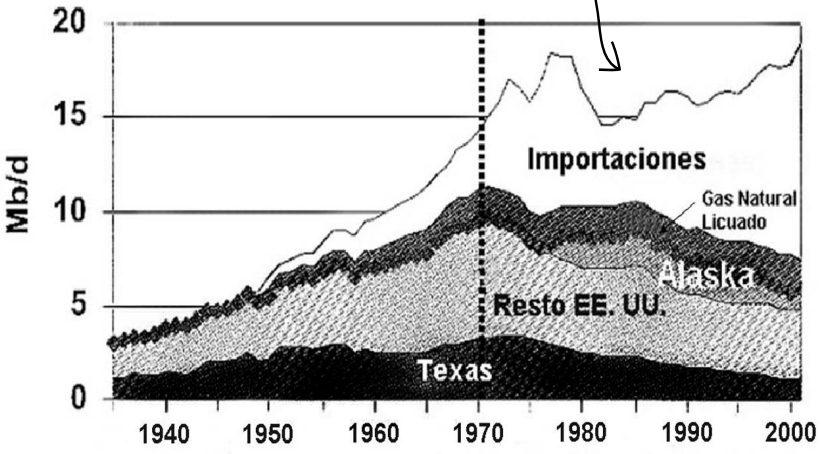
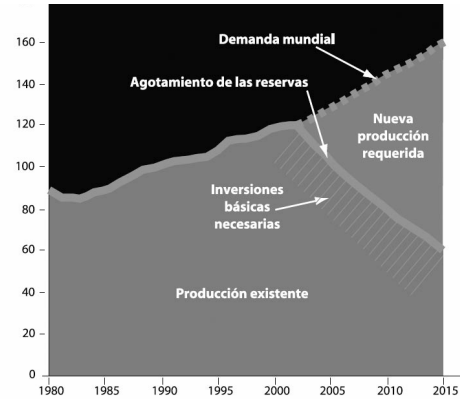


Figure 6: USA's oil production and consumption, in millions of barrels per day. Thee production peak in 1970 can be observed and the increase of imports since the 50's

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's peak is that, although demand continues increasing, the discovery of big fields has decreased since the sixties, despite the use of more and more sophisticated technologies and the competition of oil companies to secure the largest number of fields. **Since the eighties, oil consumption has exceeded discovery, so that today the has reached the worrying position where four barrels are consumed per 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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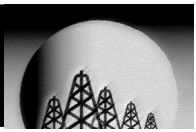


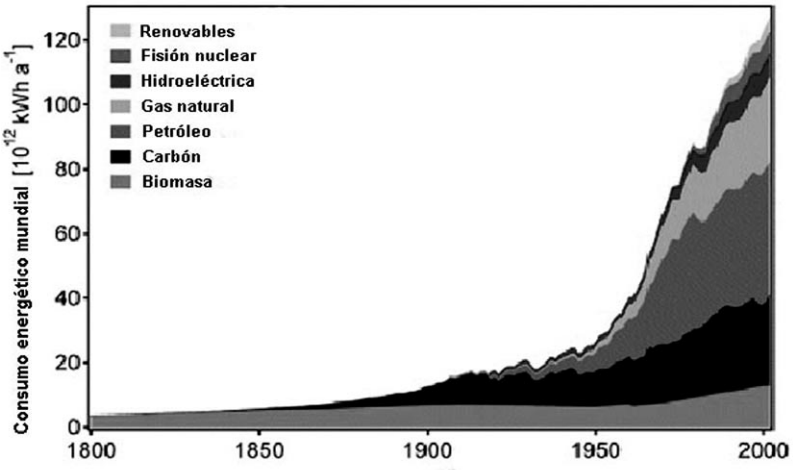
Energy saving

Considering 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, and adapt to the geological reality marked by Hubbert's curve.

If instead of acting in this way, the exploitation of the planet's oil fields is encouraged, the expected effect is that the plateau of the upper part of Hubbert's bell is lengthened, that is, that the beginning of the fall of world oil production is delayed. If it is not done, the subsequent effect will 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 growth as a basic goal of their economic 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; this would menace the financial system's balance; such policies would not be supported by social and economic agents; and this could find opposition from countries and economic institutions with which they keep international commitments. On the other hand, until recently, economic growth has always come accompanied by increases in energy consumption.
- Private companies need high consumption levels to keep their sales and profits buoyant, and they use publicity to promote, which encourages citizens to consume.
- It is not possible to reduce significantly oil consumption in many basic productive activities such as agriculture or transport.
- If it seems unlikely that most developed countries will stop increasing their consumption levels, it can be even more unlikely that countries with a lower per capita income level will accept giving up increasing theirs, due to their goal 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 19th century with the use of fossil fuels. (http://www.hydropole.ch/Hydropole/Intro/WorldE.gif)

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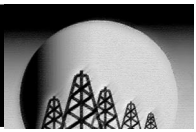
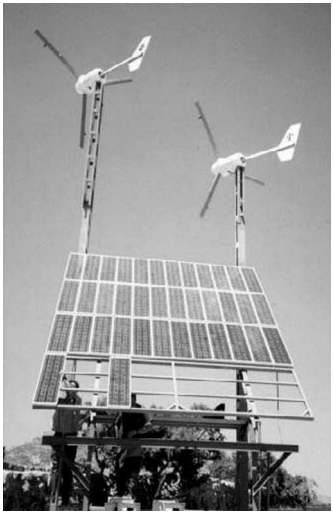


Other energy sources

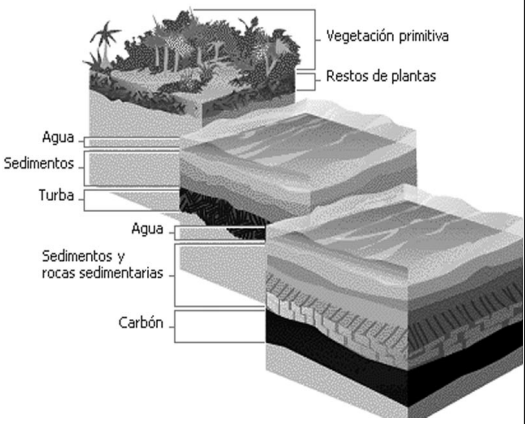


The other way to reduce oil consumption would be to begin to replace it with other energy alternatives. Today, energy sources based on non renewable finite resources (fossil fuels and nuclear fission), which generate so many pollution problems, supply 86% of the enormous global energy consumption. *(See 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 its qualities will be found in time in sufficient quantities. Even if it was, the huge present fleet of vehicles -more than 800 millions- would have to be adapted or substituted to work with it, as well as the infrastructure for

production, transport and distribution of it all over the world.



How is coal formed?
Coal was formed from generations of plants which died in old swamps, and which settled under sediments. This vegetable material formed first a compact organic material called peat. As time passed, pressure and 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)

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

COAL is a very heavy, inefficient fuel, with little versatility and a large cost of extraction and transport. It is very contaminant (both its mining and its combustion) and it causes acid rain, as well as it contributes 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 and it has many advantages, but its exploitation also contributes to the greenhouse effect and 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 will be much more pronounced. Gas shortage is already becoming a pressing problem in North America.

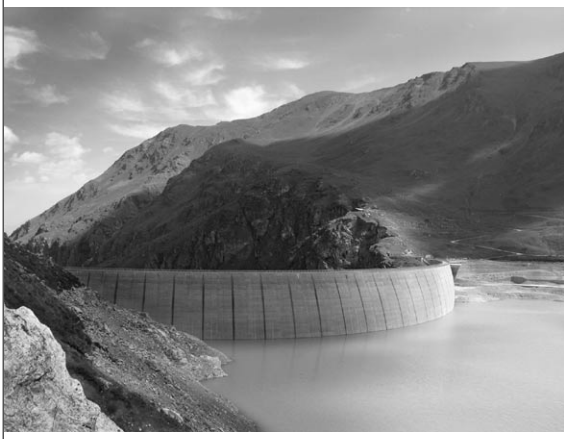
NUCLEAR FISSION

There are many difficulties in introducing nuclear fission on a large scale and in the short term: the enormous cost (economic and energy) of building and dismantling every nuclear power station; the lack of solutions to process and store dangerous waste, which emits radioactivity over thousands of years; the risk of nuclear accidents and terrorist attacks; conflicts between countries due to fear of likely use of nuclear power for military goals; 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.

(Abajo: Central nuclear de Chernóbil, Ucrania)

HYDROELECTRICITY

only contributes 2.3% of 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 force the population living behind them to move.



RENEWABLE ENERGY

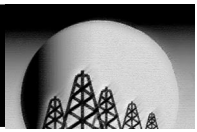
(solar, wind, tidal, geothermal...) represents only 0.5% of the world total, and its incipient development has been possible only thanks to oil availability, used both as a raw material and as energy to manufacture the necessary costly materials, and to build the infrastructure that it entails. The energy it supplies is difficult to transport and to store, and its amount varies 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 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 “black gold”.

NUCLEAR FUSION is the energy source 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, and this is still the case, although 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; it should be achieved that the energy released is more than the energy necessary to heat the fuel and keep it isolated; and finally, it is necessary to develop devices that extract the energy generated and turn it into electricity, so that a sufficiently positive energy outcome is obtained from the whole process.

Finally, **HYDROGEN** is not an energy source. 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. But free hydrogen is uncommon in Nature, and a larger amount of energy is necessary to obtain it than it supplies. Besides, it requires very low temperatures to keep liquid -which also requires energy-, it takes up a larger volume per unit of energy than petrol or diesel, and it would be necessary to adapt present vehicles to it, as well as established transport systems and fuel distribution systems.

7.



What to do in the presence of peak oil?

When considering the possibility of an impending shortage of energy resources, **the public has a conviction that there will be solutions, and that technology will solve everything, without questioning economic growth or the viability of our lifestyle and their consequences.** But until now, the improvements in energy efficiency reached by technology have not meant cuts in global energy consumption. The 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 is 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 behaviour of inhabitants all over the world, 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 to assume measures, based on cuts in consumption and private

transport, tendency to negative growth of economies and population, etc. Possibly, the whole way of life created on the base of limitless oil availability would have to be changed.

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

1) To get informed:

It is important to continue getting informed and to try to understand the implications and consequences that peak oil 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 that are taking place and to face them successfully, and to help others: and in general, to attenuate the effects on us and on other people on our surroundings.

3) To inform:

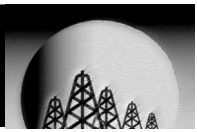
The larger the number of people understanding the situation is, the more likely it is that they will begin to adopt positive actions. One option can be to inform about the reality of energy crisis by passing this or other articles, using the means and channels available to each of us, that is, the internet, publications, mass media, local associations and authorities, educational centres, etc.

4) To Act:

We can begin to change our lives now toward a reduced consumption level in general and reduce energy consumption level in particular, which will be useful to cut our contribution to the adverse ultimate outcome where the present system is taking humanity; to reduce the pressure that our way of life exerts on the natural systems that maintain life in our planet; to slow down the pace of oil and other resources' decline; and, finally, to be better prepared for the times in which we are forced to do it. If we have reached a global situation that we face as a species by summing the individual actions of all the human beings that inhabit the Earth, then we can influence it only through the individual decision of each of us.

The decision when to begin to act so that our influence is 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


aeren
asociación para el estudio
de los recursos energéticos