

Second World Renewable Energy Forum: Renewing Civilization by Renewable Energy
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The rise and fall of the fossil energy regime

- Some considerations -

1. The rise of the fossil energy regime

Without the continuous supply and massive use of fossil energies modern capitalism would have been locked into the boundaries of biotic energy, comparable to the times of the Greek civilisation or the Roman Empire. In ancient times capitalism already set some weak roots, but could not flourish because of an insufficient technological basis and because of the lack of fossil energy

Since the planet Earth is limited also the stocks of mineralised energy are limited. The limits however are not objectively given. They depend on firstly the knowledge about reserves and resources, secondly on the cost-benefit analysis of reserves to be used, and thirdly on the dynamics of demand for fossil fuels. The latter factor depends on alternative, i.e. renewable energies and above all on the further dynamics of the industrialisation of those parts of the world which until nowadays mostly relied on agriculture, such as big newly industrialising countries like India and China.

Because of the capitalistically organised use of fossil energy, boundaries either are not taken into account or are conceived as factors of crisis. One reason is that production, distribution and consumption of fossil energies follow the principle of private profit making, so that social and ecological rationality are of secondary importance compared with the individualistic economic calculations on profits to make. Although the nature

contains all resources for mankind to survive, fossil resources allow an increase of “the wealth of nations” which since Adam Smith has been attributed to the historical mission of capitalism (a dominant metaphor which still was influential on Marx and Engels in the Communist Manifesto of 1848).

2. The congruence of the energy regime and the social forms of reproduction

One of the main advantages of fossil energies in comparison with other energies is their congruence with the logics of capitalist development:

Firstly, they can be used without considering space and place. The location of energetic resources is no more the main reason for the location of industries, for it is simple to transport energetic resources to any place in the world. The fossil energy system spreads itself. It is so to say “autopoetic”, for it allows to transport energy to remote places of the Earth and thus includes them into the fossil system. Energy supply therefore is only one factor amongst many others in the decision-making process on a production site. The availability of local sources of energy has only a minor impact on the competition of places in the global space.

Secondly, and different from solar radiation, which changes its intensity at day and night, summer and winter, or with regard to the rhythms of seasons, fossil energies can be used 24 hours a day and 365 days a year with constant intensity. They allow the organisation of production processes independent on social time schedules, biological and other natural rhythms. The time regime of modernity follows the logics of profitability and shareholder value. The reason is that fossil energies simply can be stored and consumed independent on natural times and only following the timetable of the optimisation of profits.

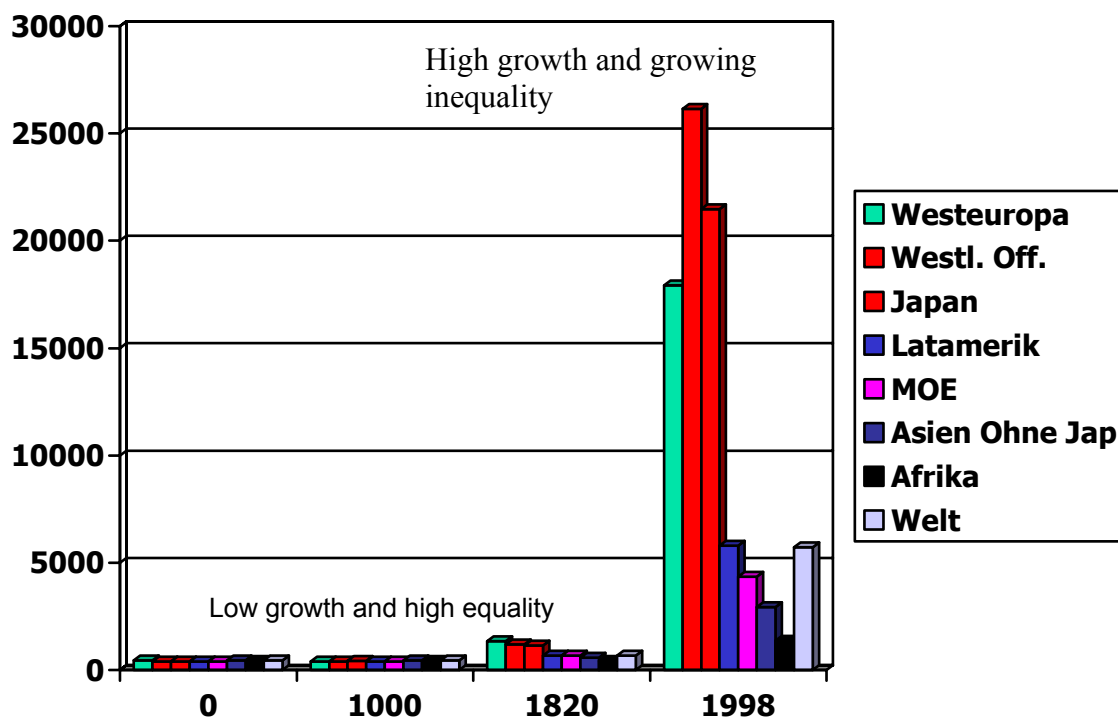
Thirdly, fossil energies allow the extreme acceleration of processes, i.e. the “compression of time and space”. This is another expression of an increase of productivity i.e. the production of more commodities within a given time span or the reduction of the time span for the production of the same amount of products. The

increase of productivity since the classical political economy has been understood as the main mission of capitalism and its justification, For, the increase of productivity results in an increase of the wealth of nations.

Fourthly, fossil energies can be used very flexibly with regard to the size of energy consumed or the temporal distribution and spatial location. The development of electricity networks and of the electro-motor, the illumination of whole cities at night, of the gasoline and diesel-motor are decisive steps for an increasingly flexible use of energy-inputs and for a mobilisation and acceleration of economic processes and for a individualisation of social life which never before in human history existed. Now managerial decisions can follow the logics of the capitalist firms without taking into account energetic restrictions or spatial and temporal necessities. Therefore, accumulation and growth are more and more understood as independent from natural conditions and their limitations.

3. The capitalist take off into “triumphant growth”

Since the emergence of modern capitalism the world population grows faster than ever before and also GNP per person grows, an indicator for the increase of productivity. In pre-capitalist and pre-industrial times economic growth was dependent on population growth which, in turn, depended – this was the rationale behind Malthus’ theory – on the supply of goods and services for subsistence and reproduction. Angus Maddison in an OECD-study showed that in the first millennium after Christ from 0 to 1000 the world population grew at an average annual rate of 0,02% from 230,8 Million to 268,3 million. From 1000 to 1820 the number increased to 1041,1 million. The same can be said about the trend of GDP per capita: in the first millennium from 0 to 1000 there was a slight decrease from 444 to 435 1990 international dollars (Maddison, of course, is aware of the problems measuring monetary flows over 2000 years in 1990 dollar-denomination. Therefore the interpretation must be more careful than usual), and from 1000 to 1820 an increase to 667 international dollars per capita. It is interesting that in the first millennium the income divergences between Western Europe, Japan, Latin America,



Eastern Europe, Africa and Asia were very small. Per capita-income reaches at the end of the first millennium from 400 dollar (Western Europe) to 450 dollar in Asia (excluding Japan). In the second millennium, however, the divergence of per capita incomes increased remarkably. In 1820 the average per capita income in Western Europe reached 1232 dollars; in Africa it was the same as 820 years before: 418 dollars (Angus Maddison, *The World Economy. A Millennial Perspective*, Development Centre Studies OECD, Paris 2001: p. 28).

Since the Industrial Revolution GDP growth has been propelled by the dynamic development of the productive forces, i.e. by increased (labour) productivity. From the second half of the 19th century average growth rates increased remarkably. This growth, however, has been extremely uneven over time and in space, and has failed to reduce the inequalities between peoples and regions in globalizing world. This also is obvious in the numbers provided by Angus Maddison. Average per capita income increased from 1820 to 1998, i.e. in only 178 years from 667 to 5709 1990 international dollars. The distribution of incomes in the same period became more uneven. In 1998 average per capita income in Western Europe was 17921 dollars, in the Western Offshoots (USA,

Canada etc.) it was 26146 dollars, in Asia (excluding Japan) it was 2936 dollars and in Africa 1368 dollars (Maddison 2002: 28).

The fetishist growth discourse

This is one of the main reasons why economic growth has become a fetish, not only in economic theory but also in political discourses, world-wide. Interestingly enough, classical political economy whose founders still were living in an overarching agrarian environment only laid the foundations of a theory of growth, but they did not elaborate on it. In the contrary some of the classical political economists praised the virtues of self sufficiency and contemplation (John Stuart Mill). Economic growth only in the XXth century was understood as the most important goal of economic activities. Growth and growth theory came up with the planning processes in the socialist Soviet Union. It became the dominant economic discourse in the course of the competition between the two systems and the development of Keynesian economics. Today the concept of growth is the most unchallenged one in economics and politicians are praising the God of growth in order to resolve all problems of the world: they reach from unemployment, poverty, underdevelopment until the fiscal crisis of the state, etc. Of course, real growth of income enlarges the funds to be distributed, therefore it facilitates political processes, but the question is: is growth possible for ever, is growth "triumphant" (Easterlin, Richard A.: Growth Triumphant. The Twenty-first Century in Historical perspective, Ann Arbor 1998)? Of course not, because nothing on earth grows eternally without any limits. In the contrary, there are many limits of growth, economic and financial ones as well as social, and above all ecological ones.

There is one caveat necessary: Although the capitalist growth machine is nearly entirely powered by fossil energy human and natural life in general is almost entirely dependent on solar radiation. Daylight, the warming of the atmosphere, of the waters and the soils, the growth of living beings, the provision of food, etc. are the result of solar radiation and only to a small extent that of the use of fossil energy consumption. The satisfaction of primary human needs only is possible by using energy in the form of organic foods

(containing proteins, fats, carbohydrates, vitamins, and minerals; water) and in a transformed manner as clothing and shelter, not to speak about the availability of oxygen.

This contradiction between life conditions and economic conditions on Earth is decisive. Capitalism has constructed a “Chinese Wall” between them. Today, and possibly for ever, it is impossible to power the machine of capitalist accumulation with solar radiation. It simply has not the already mentioned advantages, i.e. the potential of time and space compression, as fossil energies have. Vice versa, the fossil energy regime of the capitalist economy has an extremely destructive effect on living conditions on Earth, i.e. on life which is “powered” nearly completely by solar radiation.

The crisis of the fossil energy regime

Even more important than economic and financial limits to growth are ecological limits. Among them one of the main factors is the exhaustion of non-renewable fossil energies. Since the 1990s of the last century in many oil.-regions the peak of the production of fossil energy has been reached: the amount of barrels explored and found in new reserves is lower than the annual increase of oil-production, so that the stocks of oil inevitably are declining. Nobody knows exactly when oil and gas fields will be dry and empty, but it is sure that this will happen not in centuries but in a few decades. This already has been predicted by Marion King Hubbert already in the 1950s, when everybody believed in an abundance of oil. But oil-production inevitably must decline when additional reserves found are smaller than oil extracted, i.e. when the peak of oil production is crossed. There is convincing evidence that the peak in some regions already has been reached, and that is not very far in the future for global oil extraction and production (charts in the annex)

Table 1: Reserves and annual production of mineral oil and gas

	Reserves		Share of global reserves (%)		Reserves/ Production in years	
	Oil (Mio barrels)	Gas (1000 bn m ³)	Oil (Mio barrels)	Gas (1000 bn m ³)	Oil	Gas
Middle East	686	56,1	65,0	36,0	92	>200
Latin America	111	7,3	11,0	5	30	53
Africa	77	11,8	7,4	8	27	89
Russia	60	47,6	5,7	31,0	22	81
Asia/ Pacific	39	12,6	3,7	8	14	42
USA/ Canada	37	6,9	3,6	4	10	9
Europe	19	5,8	1,8	4	8	20
Caspian Region	17	6.6	1,6	4	28	57
World	1048	155,8	100,0	100	41	61
OPEC	819		78,0		82	

Source: Müller, Friedemann (2004): Klimapolitik und Energieversorgungssicherheit, SWP-Studie, Berlin, April 2004, 17

The problems arising from that unpleasant state of affairs among many others are the following ones:

(1) The “dutch disease” of oil exporting countries has often been analysed. The reliance on oil as the main commodity exported has distortions in the economy and society as a consequence. It fosters a drag of manpower, financial resources and fiscal flows from other sectors of the economy into the oil industry, in many cases accompanied by corruption in its different forms. Due to a lack of productive linkages the natural riches cannot be transformed into the “wealth of the nation”. In the contrary, the wealth increases in oil consuming industrial countries and not in the oil producing country. Only the “oil- and sand-states of the Gulf with a small population and big oil exports are an exception to this rule. Countries like Nigeria, Indonesia, Venezuela however had not the opportunity of increasing the living standard of their citizen and of avoiding social unrest, economic stagnation and ecological degradation. This is the reason why the World Bank Group set up a commission on “extractive industries” headed by the former

minister for the environment of Indonesia, Emil Salim, which came to the following result: “To help ensure that local communities receive benefits from extractive industry projects, the WBG should:

- require companies to engage in consent processes with communities and groups directly affected by projects in order to obtain their free prior and informed consent,
- require revenue sharing with local communities,
- mandate the use of poverty indicators that are monitored systematically,
- encourage the incorporation of public health components in all extractive industry projects,
- urge NGOs to build the capacities of affected communities, and
- help set up independent grievance mechanisms.”

(2) For oil importing countries the costs of energy imports again are rising due to an oil-price increase. The reason is very simple. The supply of oil on the international markets cannot sustainably be increased. In the long run it even after the peak-production will decline since reserve growth is lower than annual oil production and consumption. The reach of reserves inevitably declines. The demand however still is growing, because the energy hunger of the USA and of other industrialized countries is nearly insatiable, and because of big newly industrialising countries like China and India crowding into the market. Prices of oil are going up and increase the import burden of oil importing countries. However, the burden is not equal for all. Countries with a low income per capita have relatively higher import-expenses than countries with a high GNP per capita. The oil crisis of the 70s already displayed also another divergence. Since the oil price is expressed in US\$ countries with a currency which experiences some revaluation vis-à-vis the US\$ suffer less under an oil price increase than countries which exhibit a devaluation vis-à-vis the US\$. The “oil-seignorage”-position however is on the ticket of the USA so long as the oil price is invoiced in US\$.

Table: Flows of Oil, 2002 (mio barrels per day)

To \ From	USA	Europe	East and Southeast Asia	Rest of the World	Total
Gulf-OPEC	2,31	3,24	11,29	1,22	18,06
Former Soviet Union	0,20	4,35	0,40	0,42	5,37
North Africa	0,28	1,77	0,20	0,37	2,62
West Africa	1,12	0,71	1,04	0,26	3,13
Latin America	3,95	0,47	0,19	0,32	4,93
Canada	1,94	0,01	0,001	0,00	1,96
Rest of the World	1,56	1,35	3,21	1,44	7,56
Total	11,36	11,90	16,34	4,03	43,63

Source: Müller, Friedemann (2004): Klimapolitik und Energieversorgungssicherheit, SWP-Studie, Berlin, April 2004, 16

Table:

Imports of fuels and Export revenues of selected countries, 2002 (in Mio US\$)

Country	Imports of fuels	Total export-revenues	Share of fuel imports in total imports (%)	Share of fuel imports in export revenues
Argentina ^a	798	26610	3,9	2,9
Brasil	7549	60362	15,2	12,5
Peru	1034	7688	13,7	13,4
Mexico	4455	160682	2,3	2,7
Pakistan	3004	9913	26,7	30,3
South Afrika	3269	29723	13,0	11,0
China	19285	325565	6,5	5,9
India ^a	15935	49251	31,7	32,4
USA	121927	693860	10,1	17,6
Europ. Union ^b	129868	939804	13,9	13,8

^a 2001; ^b Imports and Exports from or to third countries

Quelle: WTO, Trade Statistics 2003

Oil Imperialism

(3) Under conditions of increasing scarcity conflicts about access to oil-reserves are becoming sharper. The provision of oil, although performed by single countries and private corporations, can be understood as a (global) public good. Each nation following the logics of industrial and post-industrial capitalism is constrained to have access to the common good of fossil fuel reserves. But under the conditions of scarcity the global commons of oil reserves transform into a “positional good”. Its distribution either can be left to the market forces and the processes of price formation, so that those oil consumers which do not afford to pay for the oil invoices lose the access. Or, it can be organized in a democratic, solidary rationing of oil reserves; this perspective however in these times is not realistic. The third mode of distributing oil reserves is that of the exercise of violence and power. It is rather likely that the first and the third mode and a mixture between both will rule the “great game” on the scarce oil resources in the coming future.

The mixture of market forces and (military) power is reflected in the ideologies of US-american neo-conservatives between neo-liberal glorification of a free market in a “geo-economy” and the “geo-political” recourse to military power. This combination of geo-economics and geo-politics in discourses of the political elites in the USA only at the first glance is contradictory, at the second glance it refers to a long tradition of an “oil-empire”. The US-American wealth, power and supremacy are found on “cheap and abundant oil flows” (Michael Klare) from the 19th century until nowadays.

(4) Oil security is one of the priorities of US-American politics (Cheney report 2001). It refers to several dimensions: (1) Strategic control over oil territories, (2) strategic control over oil-logistics (pipe lines, routes of oil tankers, secure refineries and storage), (3) exercise of influence on the supply, (4) influencing the price formation by partly controlling oil demand, and last not least (5) the determination of the currency in which the price of oil is invoiced. Having this complexity of elements of a strategy of oil security or “oil imperialism” in mind, the simple formula of “blood for oil” is much too undercomplex. It is simple, however it is not wrong.

The USA try to get strategic control over oil regions, either by means of diplomacy and the establishment of friendly relations as in the Gulf region, or by means of subversion as in some Latin American and African countries, or by using military power as in Iraq and to a lesser extent also in Central Asia. The Iraq is a good example for the irrationality included, because the military domination imposed on a country against the resistance of a hostile population is extremely expensive and in an unimaginable way also demoralising with incalculable effects on hegemony of the global superpower. The strategic control of oil logistics is expensive too, although to a lesser extent. It prerequisites collaboration of many governments of transit-countries of pipe lines or of coast-countries to protect the routes of oil tank-ships.

The influence on the supply of oil only is possible either by influencing OPEC or by using diplomatic pressure on single oil producers or by enforcing oil exploration in parts of the world which until nowadays are not fully included into the oil-empire. The occupation of Iraq and the establishment of a US-dependent only formally sovereign government allows the USA to exert some influence on OPEC-decisions since the Iraq is a member country. Diplomatic pressure on oil producers in order to increase their exports is a very common measure of rich oil consuming countries, not only of the USA. It is doubtful whether global supply will largely be shaped by newly explored oil reserves. It is unlikely that new reserves can hold pace with the growing demand for oil.

Is it possible to influence the demand? Yes and no, because on the one hand the USA still are the most important oil consumer. On the other hand new oil consumers crowd into the market, China and India and other newly industrializing countries. China and India alone are responsible for three quarters of the additional oil demand in 2004. It is unlikely that this situation will change. A reduction of demand therefore only seems to be a realistic objective by substituting oil by renewable energies.

(5) In 1973 the oil exporting countries only had one alternative when the US\$ experienced a depreciation vis-à-vis other currencies and the inflation rate in the USA increased: Oil exporting countries could not change the currency, but only exploit the opportunity of the Israelian-Arabian Yom Kippur-war of October 1973 to increase the oil-price which had been interpreted by oil importers as a “shock”. In June 2003 the

OPEC decided to invoice in US\$, although some governments already undertook considerations to switch into the Euro, above all Venezuela. The domination of all the other dimensions of “oil governance” by the USA makes sure that a change of the oil currency in the next future will not take place. However, it is not sure that this comfortable situation will last for ever. The loss of value of the US\$ vis-à-vis the Euro and the huge twin deficit are factors which make the Euro as a oil-currency more attractive for oil exporters.

The necessity of a transition to a renewable energy regime

Thus, on the horizon of the disputes on oil appears a harsh conflict between the US\$ and the Euro, between North-America and Europe. Oil imperialism obviously includes conflict-dimensions which have the potential to jeopardizing peaceful co-existence of peoples in the world. The new Constitution of the European Union, which until now is not yet ratified, provides a common European military power for intervention in all parts of the global space in order to strengthen European security. The new concept of security also includes energy-security. So long as this is identical with the secure supply of oil and gas from the oil regions the dependence on fossil energy is conflict-prone.

The fossil energy-regime at the brink of the exhaustion of reserves and in view of the negative consequences of fossil energy combustion on the global environment have an increasingly negative impact on the global public good of world peace. Therefore all efforts should be undertaken in order to develop an alternative energy regime based on renewable resources, i.e. on the radiation energy of the sun. It is necessary to overcome the above mentioned energetic “Chinese wall”.

Annex

The peak of oil production is reached. The following charts are from <http://www.energiekrise.de>. The table on real interest rates, indicating financial limits to growth, is from Altvater, Elmar: Inflationäre Deflation oder die Dominanz der globalen

Finanzmärkte, in: PROKLA – Zeitschrift für kritische Sozialwissenschaft, März 2004:
41-60

Financial limits to growth: High real interest rates

Tabelle :

Zuwachsraten von Bruttoinlandsprodukt (in Preisen von 1995), Inflation und Renditen von Schatzanweisungen mit 10jähriger Laufzeit

	1980	81	82	83	84	85	86	87	88	89	1990	91	92	93	94	95	96	97	98	99	2000	01
Bruttoinlandsprodukt zu konstanten Preisen																						
Welt	2,9	2,2	1,2	3,0	4,9	3,7	3,7	4,1	4,7	3,7	2,8	1,6	2,2	2,4	3,7	3,7	4,0	4,2	2,8	3,6	4,8	2,4
G7	2,0	1,8	-0,2	3,1	5,0	3,6	3,1	3,4	4,6	3,7	2,8	1,0	2,0	1,3	3,1	2,4	2,7	3,2	2,8	3,0	3,5	0,8
Entwicklungsländer	4,4	2,8	2,5	2,7	5,9	5,0	4,5	5,4	4,7	4,1	3,6	5,0	6,2	6,3	6,7	6,1	6,6	5,9	3,5	3,9	5,7	4,1
Westl. Hemisphäre	6,3	0,9	-0,7	-2,6	3,7	3,1	4,4	3,4	1,1	1,5	0,6	4,0	3,6	4,0	5,0	1,8	3,6	5,2	2,3	0,2	4,0	0,7
Inflation																						
Welt	16,9	14,1	12,6	13,1	14,1	13,7	10,4	12,8	17,6	22,9	25,5	22,5	38,4	36,0	29,4	15,5	9,1	6,3	5,8	5,4	4,6	4,3
G7	12,3	10,2	6,2	5,6	4,6	3,9	2,1	2,8	3,2	4,2	4,8	4,3	3,2	2,8	2,2	2,3	2,2	2,0	1,3	1,4	2,2	2,0
USA	13,51	10,32	6,16	3,21	4,32	3,56	1,86	3,74	4,01	4,83	5,40	4,23	3,03	2,95	2,61	2,81	2,93	2,34	1,55	2,19	3,38	2,83
Euro-Raum																	2,15	1,58	1,09	1,12	2,34	2,11
Entwicklungsländer	31,0	26,4	26,7	34,0	39,1	39,8	30,7	38,9	58,1	72,4	76,2	41,7	43,2	49,1	55,6	23,3	15,3	9,9	10,4	6,5	5,8	5,8
Westl. Hemisphäre	65,0	55,3	66,4	100,8	124,6	135,1	82,4	117,4	222,3	372,2	482,0	136,4	148,3	194,8	201,4	36,1	20,9	12,4	9,2	7,4	6,8	6,4
Mittel- und Osteuropa																						
Zinsen (10-Jahres-Regierungsanleihen)																						
USA	11,46	13,91	13,00	11,11	12,44	10,62	7,68	8,38	8,85	8,50	8,55	7,86	7,01	5,87	7,08	6,58	6,44	6,35	5,26	5,64	6,03	5,02
Euro-Gebiet															8,18	8,73	7,23	5,96	4,70	4,66	5,44	5,03

Deutschland	8,50	10,38	8,95	7,89	7,78	6,87	5,92	5,84	6,10	7,09	8,88	8,63	7,96	6,28	6,67	6,50	5,63	5,08	4,39	4,26	5,24	4,70
UK	13,79	14,74	12,88	10,81	10,42	10,50	9,86	9,47	9,36	9,58	11,08	9,92	9,12	7,87	8,05	8,26	8,10	7,09	5,45	4,70	4,68	4,78
Korea	28,76	23,62	17,42	13,08	14,32	13,58	11,57	12,43	13,04	14,74	15,03	16,46	15,08	12,08	12,30	12,40	10,90	11,70	12,80	8,72	8,50	6,66
Mexiko																51,74	32,81	21,44	n.a.	20,11	15,81	10,28

Realzinsen (Zinsen abzüglich Inflationsrate)

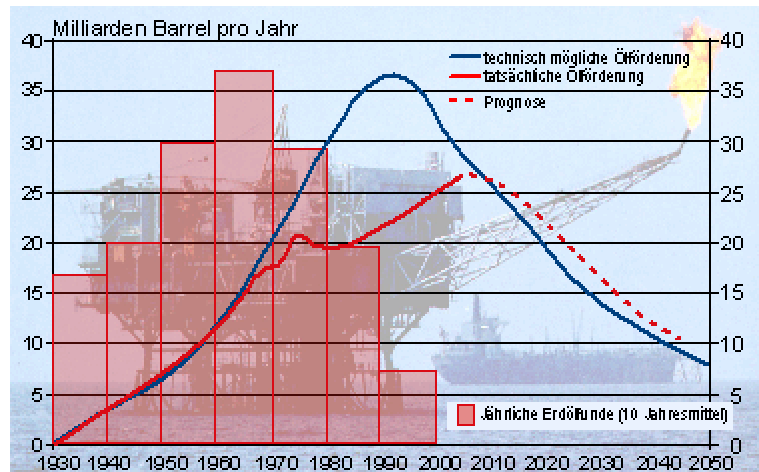
USA	-2,03	2,59	6,82	7,90	8,12	7,06	5,82	4,64	4,84	3,67	3,15	3,63	4,02	2,92	4,47	3,77	3,51	4,01	3,71	3,35	2,65	2,19
Euroraum																	5,08	4,38	3,61	3,58	3,06	2,92

Quelle: IMF, World Economic Outlook, Database, <http://www.imf.org/external/pubs/ft/weo/2003/02/data/index.htm>

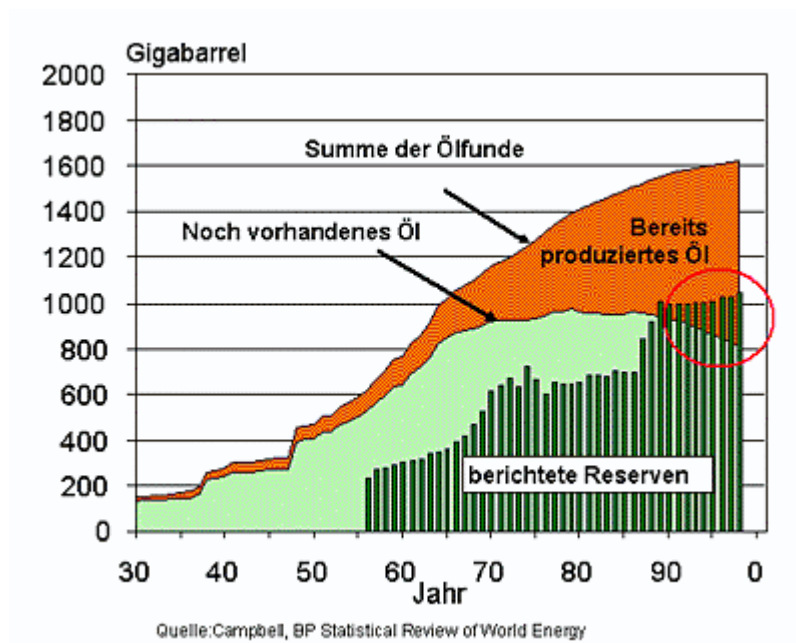
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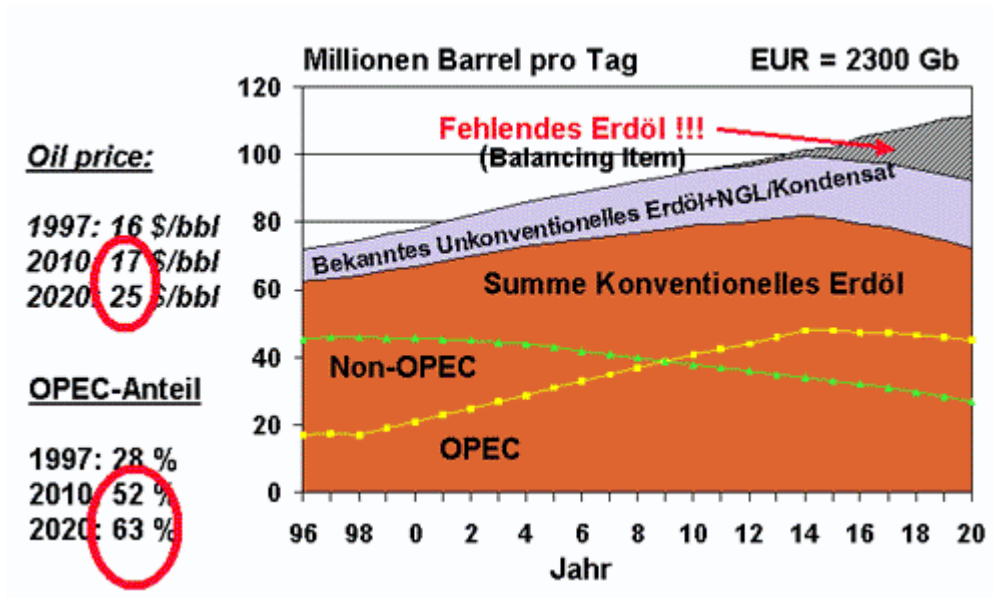
The following charts stem from the internet-page :

<http://www.energiekrise.de>

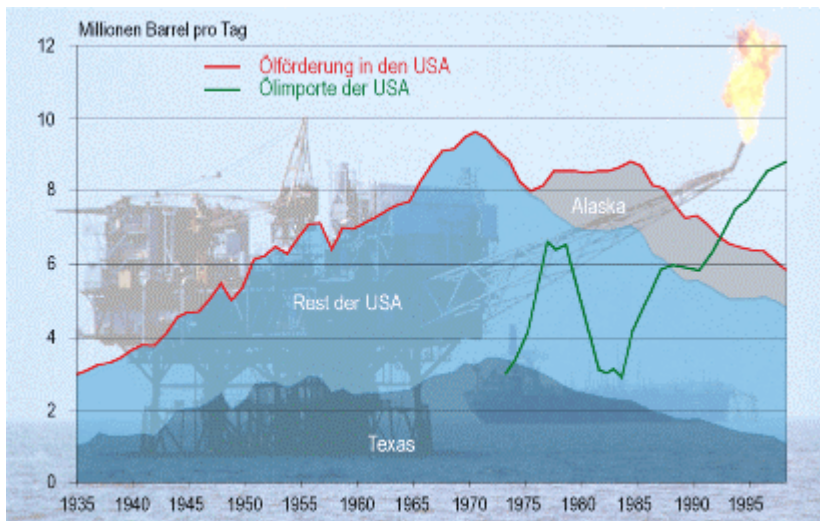


Weltölvreserven Reporting





Erdöl in den USA



Ölverbrauch im Verkehr

Weltweit steigt der Ölbedarf für Verkehrszwecke

