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Limits of Energy Resources and Endless Waste of Power – Danger for the Economic Growth

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ABSTRACT: The objective of this paper is to establish the interconnection between exhaustion of resources and limits of economic growth. It has become evident that accelerated exploitation of mineral and energy resources, mainly by the highly industrialized countries, brings to enlargement of economic and environmental conflicts in the entire world. The mankind has never been in front of a higher global hazard, caused by the deterioration of environment as the deterioration of recent days.

ОГРАНИЧЕНОСТ НА РЕСУРСИТЕ И БЕЗКРАЙНО ИЗРАЗХОДВАНЕ НА ЕНЕРГИЯТА – ОПАСНОСТ ЗА ИКОНОМИЧЕСКИЯ РАСТЕЖ?
РЕЗЮМЕ: Цел на тази работа е да установи връзката между изчерпването на суровините и ограничаването на икономическия растеж. Става ясно, че чрез ускореното експлоатиране на минералните и енергийни ресурси, главно от индустриалните страни, нарастват икономическите и екологичните конфликти навсякъде по света. Никога досега човечеството не е стояло пред по-голяма глобална заплаха, предизвикана от многообразното разрушаване на околната среда, както в наши дни.

Introduction

Applying its increasing pretence for nature – mainly since the industrial revolution – the man provoked in environment higher changes than any other challenges during the history of the World. There have never been such meaningful and visible in the natural circle of environment[1].

Significant increase of the number of population on the Earth, increasing needs and partially over-estimated needs are among the major issues, which recently face the mankind – issues frightening the existence of mankind.

To comply with the principles of economy, which is absolutely insensitive towards nature each machine has to work faster and faster[2]. However, each machine, which works faster and faster needs to be fed with more and more fuel and resources and releases more and more heat, waste and gases, which are distributed in the environment and overload it.

Exhaustion of natural resources and neglecting of laws of nature brings to loadings, which may not be managed in a long–term aspect, if the same attitude towards nature is maintained. Environmentally technical measures also consume additional power and resources.

Scientists-geologists have an additional task today. They need to prospect not only for resources, but also for secure depository areas and tailings ponds for the wastes from civilization. However, they need to – exactly for the well-being of future generation – remove anthropogenic damages on the environment, which are provoked by the prospecting, winning, processing and exhaustion of resources. Consequences from the exhausting consumption of resources and arising wastes and impact on the future of the ecosystems of recent and future generations need to be specified by the scientists – geologists.

Limited resources – new boundaries for the growth

The scope of reserves, respectively, resources of conventional power represent a new boundary for the growth and this needs to be discussed in details.

Today, fossil fuel represents nearly 90 % of commercial power resources. Furthermore, this thus not includes traditional fuel (timber, natural peat), which amounts to 5 – 10 % of the commercial power resources. The highest share of nuclear power compared to hydropower energy comes from the fact that nuclear power in the balance of power holds the final power multiplied by the factor of 3, which has to correspond to the thermal factor of efficiency of 33 %, while the electric power obtained from water force is estimated to 10 % of the main power.

The power economy differs reserves (the mining of which is profitable) and resources (the mining of which is not profitable). The ratio of reserves towards consumption (reserves towards mined production, respectively) is treated as a static range for a certain energy resource and certain period of time.

The static range has not been reduced globally, on the basis of prospective results of geologists during the time., which might be expected, and remained constant and it was even enhanced. The proved reserves of oil, according to data of the International Institute of Resources are increase in the years 1973 – 1993 with 60 %, and for natural gas – with 140 %.

That facts slightly changes the limits of fossil fuel, because in the historical ages of the Earth, the scope of power resources undoubtedly decreases insignificantly. In case of constant consumption the oil will be enough for 40 years, natural gas for 60 years, and coal for 200 years.

According to a study of the Royal Dutch - Shell Group entitled "Perspectives of oil and gas in the 21 century" the new energy resources, as wind power, sun power and the biomass

power will be in 2020 without subsides as competitive as the fossil fuel. The prospecting for mineral oil and other liquefied carriers of power and synthetic fuel, based on heavy oils or condensate of natural gas will increase in the next 25 years with 2/3 for the entire world, according to the study. However, in the meantime, production will be much more expensive. The intensive reduction of cost, due to new methods and advanced materials, as sun-power has not been taken into consideration.

In its report "The World resources, 1996 – 97" the WRI emphasizes that world power markets are well developed and relatively flexible. Furthermore, there are substitutes, which in used in case of insufficiency of one or another energy resource. For that reason it may be admitted that prices of energy resources will gradually be enhanced but it they will not be a reason for the enhancement of power consumption.

Of course, there are voices, which say that the modern tendency is based on the opinion of global oil and gas concerns, which need confidence on the oil and gas market. In case of a fast change of the attitude sellers – buyers, the severe price reaction of world energy markets has to be taken into consideration.

WRI devoted the comprehensive analysis and the above-mentioned report for difficulties, related to underestimation of resources. In general, the studies about future power consumption are based mainly on economic factors, they do not take into account specific physical boundaries of energy reserves, while studies for energy resources comprise both geological and economical factors and outline another perspective.

At the moment, which means for a rather short period of time, for example the concerns about the so-called oil reserves are transitional and for that reason the production will get to its apogee and afterwards it will fall down. When will that happen? Which means, how immense will prove to be the reserves depends also on the fact how higher cost will be profitable for the exploitation of marginal deposits. We should approach very carefully to the debates among oil geologists, energy economists, oil concerns and another interested parties for the volume of real reserves and approach to the production maximum and to give a matter competence to the above topics.

Another important factor is the fact that the prevailing share of oil reserves is concentrated in a small number of countries, most of which are in politically unstable regions. The strong reaction of USA for the conquer of Kuwait by Iraq witnesses the dependence of industrial nations on the crude oil resources in that area and shows how fast can the position be changed.

Estimations of reserves for a certain region are based on seismic data, knowledge about the type of the basin, where the oil appeared initially, testing well holes, limits of the production technology and naturally estimated range of oil limits. Geologists state that obtained estimations for quantity of oil may predict a completely typical profile for production history of a certain region. After an increase of production, approximately to the half of estimated reserves, it will sharply fall down. That exactly happened with the prediction of oil reserves in the United states.

Petroconsultant S.A., a Swiss Geneva-based consulting company, which deal with collecting of data and estimations about oil reserves, defends the opinion that world oil production will follow a similar model. According to the main scenario of its development, which is based on an extended data base, production will reach its peak between the years 1998 and 2002 and after wards it will fall down. Other more conventional estimations forecast the peak between the years 2010 and 2025. The expert of Petroconsultant S.A. develop their conclusions on the basis of the following suggestions:

- Estimations of governments for present reserves, mainly in the Middle East, are exaggerated and contain reserves, which may not be produced for both economic and technical reasons.
- Most of the large oil reserves have already been prospected.
- Neither oil prices nor improved production technologies may affect significantly the production and exploration of oil, to the contrary of the consideration of economists (the largest oil fields Alaska and the North Sea were in fact discovered when the oil price was very low, while today, comparing the high price of oil and production cost, no new oil fields are discovered).

The conventional energy resources will be discussed in brief:

Digits are got from the report of World Resources 1996 – 97 на Washington World Resources Institute, which was developed with the joint effort of United Nations Environment Programme (UNEP) and the United Nations Development Programme (UNDP) and the World Bank.

Oil

Reserves of crude oil are very important because it has a central role in the power supply for the mankind and world power markets. It may directly be transported and for that reason it dominates in the international commerce and represents 40 % (including other liquefied fuel) from the world power commerce.

The increase of reserves, estimated during the decade (1984 – 94) to + 43% is mainly based on the account of two new estimations of oil reserves of 1987 and 1989 for the Middle East, where more than 65 % of the world reserves of crude oil are concentrated. Since 1989 the newly discovered oil fields, supplements and revisions to world production as well as world reserves for that period have been unchanged.

The impression that there is no activity is false. For many nations, consuming power, the reserves are dramatically reduced. In the former Soviet Union, in spite of the economic collision reserves are reduced with 10 % and are now exhausted at 60 – 90 % for one decade (1984 – 1994). In the USA reserves are reduced with even 14 % for the same period of time.

Solid fuel

Reserves of solid fuel as coal, brown coal and peat are relatively high and in a world scale they are 27%. India and China have very large deposits of coal, which are applied for the production of nearly 3/4 of the power. The economic growth in those countries, especially in Asia, will bring to the increase of the use of coal.

Natural gas

Natural gas has experienced a boom in its use for the last years. It represents 23 % of the world energy commerce, and

its production has been increased with more than 70 % for the last 20 years. Nevertheless that estimated reserves enhanced significantly, there is still less gas than oil.

Russia has the largest reserves of 48,160 billion cubic meters (1993), which corresponds to 1/3 of the world reserves and ten times more than the reserves of USA. Another large deposits are available in the Middle East.

Uranium

Nuclear power may not be considered as conventional power source. However, it differs from the renewable power sources, because it is exhaustible and for that reason a rather limited alternative. In case of the recent uranium consumption and having in mind that many mines are non-profitable due to the over-production and cost reduction. Nuclear power is mainly applied for electricity production and may not be compared with the use of fossil fuel.

Conclusion

Today, no one has a comprehensive answer to all the new challenges. Answers will be developed at international and national debates in a peaceful dialogue to avoid the global catastrophe.

We should not make a step backward because of the integrated and comprehensive problems of the future. The global issues of environment and human civilization resulted from our development and the approach we have applied to communicate with nature. However, we will need to learn to communicate with nature without wasting our capital – the natural resources. That change in mind is something unusual. It needs knowledge, fantasy and involvement[4].

Cooperation and not suppression slow development and not fast advance were the principles of the four-milliard year history of life on the Earth to make societies able to develop. That is what we need to be learned by history.

References

[1] Faber M., Niemes, H. und Stephan G., (1983): Entropie, Umweltschutz und Rohstoffverbrauch – Eine natur-wissenschaftlich ökonomische Untersuchung – Lecture Notes in Economics and Mathematical systems, 214, 1983, 181 S.

[2] Walliser O.H., 1986: Global Bio-Events – A critical approach. Springer Verlag. Berlin, 1986, S. 442.

[3] UNEP (1983): Umwelt Weltweit. Bericht des Umwel-tprogramms der Vereinigten Nationen. E. Schmidt Verlag, Berlin, 1983, 668 S.

[4] Jungk R., (1990): Zukunft zwischen Angst und Hoffnung. Ein pllädoyer für die politische Phantasie. Heyne Verlag, München, 1990, 325 S.