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Eco-Socialism or Barbarism

**An up-to-date
Critique of Capitalism**

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AN APPEAL

Capitalism is Failing

In 1989, in Europe, something broke down which many leftists had, despite some doubts, called socialism (after all, capitalism had been abolished in the so-called socialist countries). In China, of course, formally still the Communist Party is ruling. But in the economy, since the beginning of the 1980s, it appears that capitalism is being restored. In the beginning of the 1990s, one could hear all over the world the triumphal shouts of capitalism. The philosopher Francis Fukuyama even grandiosely proclaimed “the end of history” – in the sense of final world-wide victory of liberal-democratic capitalism over all other system-ideals. Many people could not imagine any reason why the era of world peace, which, they thought, had just begun, could ever come to an end.

But these triumphal shouts did not last long. Since about the middle of the 1990s we are experiencing the beginning of a new phase of world history.

Already in the first half of the 1990s came, instead of the hoped-for “peace dividends” after the end of the Cold War, the immense horrors of the hot “new wars” – the unending series of small wars of the warlords, ethnic groups, nationalities and states (Somalia, Yugoslavia, Rwanda, Sri Lanka, Chechenia etc.). Since 2001, we are again experiencing old-style full-scale imperialist wars (Afghanistan, Irak).

Today, also in the economic and social sphere, the failure of capitalism as an economic system is becoming obvious. In almost all countries mass unemployment prevails. Where the economy is growing, mostly it is jobless growth. The welfare state is being dismantled everywhere. Almost everywhere one hears of crisis of one or the other kind. In large parts of the world abject poverty prevails. Establishment economists are at a loss. Keynesianism had failed already in the 1970s, although some economists still unwaveringly adhere to the old recipes. Today we are experiencing the bankruptcy of the latest economic doctrine, namely of neo-liberalism. Economic globalisation has become a curse. Economic cold wars are going on everywhere. A large part of humanity is living under the constant fear that tomorrow one may lose the material basis of survival. Crime is growing rapidly, the suicide rate is rising, and more and more people are suffering from some or other kind of mental illness. That cannot be the picture of a victorious world system. In retrospect one finds it true what one could hear already in 1989: capitalism is not victorious, it has only survived.

Whereas until a few years ago the ideologues of capitalism could say in a tone of utter conviction that they were already working on reconciling capitalism with the requirements of a healthy environment, today they are fighting bitterly against the slightest concession demanded of them in the name of ecology, for example, against the very modest targets of reduction in CO₂-emission laid down in the Kyoto-protocol. Ecology is totally out. One hears only of economic growth. Many established Green parties have long ago given up the goal of trying to implement what is ecologically necessary. One by one, they are now giving up even the rest of the remaining goals. For example, in Germany, they have recently dropped the goal of changing the transportation system. What matters is only economic growth, and nothing else.

But nature is “taking revenge” (Frederick Engels). Even scientists of the Pentagon (see appendix I.) are warning us of an apocalyptic future scenario: The dramatic climate changes will put people and governments in dire straits; oil will become ever scarcer; bloody conflicts will increase; wars for raw materials, water and food will devastate continents; within a few years, the world will be on the verge of total anarchy.

There is no doubt any more: capitalism as a world system is failing. All over the world, also in the rich industrial countries, the manifold crisis of capitalism has become acute. Its ideologues cannot see any way out of it. Some of them apparently recognise that there is a fundamental contradiction between ecology and their kind of economy and that it cannot be resolved within their system. Already since the mid-1990s, we are observing how under the burden of different kinds of crisis many parts of the world are getting drowned in wars, chaos and, yes, barbarism. The number of “failed states” is growing.

What is to be done?

Against the background of this world situation, and while millions of human beings are crying out for an alternative, everywhere the Left appears to be paralyzed. And it is totally fragmented. Actually, just now, we should all be saying loudly and offensively that there are no solutions in capitalism to the various crises the world is suffering from and that solutions are possible only in a newly conceived socialism. But apparently we are still paralyzed by the shock of 1989.

It is understandable that most frustrated and angry people in the rich Western countries still cherish the illusion that they can defend their welfare state and their jobs and wages through demonstrations, strikes and other kinds of protest without having to call capitalism itself into question. Or they cherish the illusion – which is promoted by trade unionists, Social Democrats and economists close to them, but also by activists in the various social movements against neoliberal politics – that Keynesian economic policies could generate more growth, new jobs and more prosperity. Attac, the international organisation critical of globalization, for instance, speaks in its central motto of “a different world”. However, when they speak more concretely, they speak only of “making” globalised capitalism “just”. There are also many who, of course, cherish no illusions, but have resigned in view of the collapse of “socialism”. In spite of all that, the time is now ripe for a new offensive campaign for a new socialism. In 2004, in Germany, a large opinion poll showed that most people there think that socialism is a very good idea, but that its implementation is a problem. If we socialists do not take the initiative, if we do not fill the intellectual-ideological vacuum that is arising because capitalism is failing, then that would be done by the Neo-Nazis. Against the backdrop of the progressive dismantling of the welfare state and large-scale unemployment they are now emphatically posing as national socialists.

Of course, we are today miles away from raising the question of power. At present the more important task is something else, namely to achieve the intellectual-ideological hegemony in the sense of Antonio Gramsci. Leszek Kolakowski summarised Gramsci’s position in the following words: “Every class tries to occupy a leading position not only in the institutions of power, but also in the actually expressed opinions, values and norms in the majority of society. The privileged classes have occupied a leading position and subjugated the exploited people not only politically but also intellectually. What is more, the intellectual hegemony is a precondition of political hegemony” (Kolakowski, Vol.3, 1979: 266).

The question as to the agents of the project of a new socialism need not be discussed at this point of time. The first task is to delegitimize capitalism. Millions of people must realise that overcoming the crises and, in the end, ensuring the survival of mankind are not possible as long as capitalism continues to exist. People have to be convinced of the necessity of a newly conceived socialism. The practical question as to how capitalism could be overcome should be put last. It is also not so easy to answer this question. First the intellectual-ideological foundation for this work must be laid.

We know that among us leftists serious differences exist on a number of questions of detail. But in the matter of critique of capitalism there exists extensive agreement. That can be a common starting point. Also the question as to how our alternative to capitalism, namely a new socialism, would look like in detail cannot be answered in advance. Especially in terms of our understanding of politics, the concrete details would not be designed on a writing table, but would develop in the course of concrete developments in the material world, in the course of the movement and on the basis of reflections on both. For this reason we have here consciously desisted from presenting concrete details of our alternative and our strategy for change, although they are taking shape in our mind. We want to give here only the impulse for a lively discussion process and for possible actions. We have therefore limited ourselves to presenting only the basics of our analysis and our vision eco-socialism, which we consider to be not only desirable but also necessary. For a detailed and scientific argumentation for and presentation of this conception of eco-socialism (there are also others) we refer to Saral Sarkar's book *Eco-Socialism or Eco-Capitalism – a Critical Analysis of Humanity's Fundamental Choices* (1999).

We hope that many people, who are worried about the state of humanity and nature as a whole, will take up these thoughts and, together with others, seek opportunities to become active for the ideal of eco-socialism. We also call on you to get in touch with us for further discussions and for developing concrete activities (contact address on back cover).

Cologne and Mainz, March 2008

Saral Sarkar

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THE MOST URGENT SOCIAL ISSUE

The capitalistic and large-scale-industrial economic model and way of life, which have got the upper hand in the whole world, have accelerated a two-fold destruction process: the process of destruction of our natural basis of life and, simultaneously, the process of exclusion of ever larger sections of humanity from the economic and social bases of living. The two processes reinforce each other.

The ecological crisis is qualitatively different from all hitherto experienced crises in world history. For the first time in the history of mankind it seems probable that the human species will nearly wipe itself out within a few decades. That means that the ecological crisis is not limited to certain regions, but has a global dimension. The continuous degradation of the natural basis of life impairs the material basis of livelihood of a large part of humanity. A growing number of climate related catastrophes are generating frequent emergency situations. They negatively affect all spheres of politics and social life, limit the leeway for undertaking necessary changes in society as a whole, and so they become the main cause of manifold other crises and of violence within societies and between states. Under such circumstances also the continued maintenance of a minimum of democratic structures would not be possible any more.

The possibilities of existence of the greater part of the present generations of humanity and that of the future generations are connected in many ways:

1. The main cause of the destruction of nature on the one hand and that of the world-wide process of impoverishment or economic-social exclusion on the other are the same: the capitalist economic system – especially in its present-day escalation under the neo-liberal paradigm – which is now prevailing all over the world and which is subject to a growth compulsion.
2. The ineluctable survival strategies of those who have been made poor often necessarily lead to environmental destruction.
3. The growing world-wide chasm between the rich and the poor finds direct and the most evident expression in an extremely unequal proportion of consumption of natural resources. The rich 20 percent of the world population, those living in the OECD-states, consume more than

80 percent of the non-renewable energy and other resources, and they (therefore) dump 80 percent of the polluting substances in the biosphere. (However, in the case of many non-renewable resources China and India are at present racing to catch up with the OECD states.)

4. The environmental costs resulting from the consumption of natural resources in the rich industrial countries and climate change are for the most part saddled upon the impoverished majority of the Third World people. A 1992 study of the Fraunhofer Institute estimates that if the present course is not radically changed, an additional 900 Million to 1.8 billion starvation deaths will take place till 2030 due to shifts in the vegetation zones. That means, a starvation catastrophe of hitherto unknown dimensions would result not from any distribution injustices, but as a direct consequence of climate change (cf. Wohlmeyer 1994: 221f.). Not included in the figure are would-be victims of rapidly spreading diseases like malaria or catastrophes like floods, hurricanes etc.. Already today, apart from economic and political power relations, ecological devastation is a direct cause of growing impoverishment in the Third World. For instance, since the mid-1970s, due to global warming the amount of precipitation in the sub-Saharan Sahel-zone has gone down by ca. 40 percent. The ravages of hurricane „Mitch“ (1998) in large parts of Central America and the intensification of the climate phenomenon „El Nino“, which inter alia caused drought catastrophes in South East Asia, are probably directly connected with global warming. In South China, today, the livelihood of 300 Million people is endangered through the rapid melting of the Himalaya glaciers. According to the International Red Cross there are already over 50 Million environmental refugees in the world. Undoubtedly, seen globally, the most urgent social question is the ecology question.

The concept that is central to calculating the eco-balance of our economic activities is that of environmental space. It can be defined as the amount and quality of economic activities that can be undertaken within the limits of nature's capacity to regenerate itself. Thereby we grant every citizen of the world the right to an equal share of nature's resources and sinks. The concept was originally developed by the Dutch economist Hans Opschoor. The study Sustainable Germany (in German: Zukunftsfähiges Deutschland) of the Wuppertal Institute, which was commissioned by BUND (Friends of the Earth, Germany) and Misereor (the Catholic Charity

Organisation in Germany), developed the concept further and stressed thereby the aspect of global justice. According to this study, environmental space should be determined by four criteria: (a) ecological carrying capacity, (b) ability of nature to regenerate itself, (c) availability of resources and (d) global equality of opportunity, i.e. equal right of every human being to use nature, no matter whether he lives in the Netherlands or in Burkina Faso (cf. *Zukunftsfähiges Deutschland*, pp. 133 - 138). So here the criterion of global justice is already integrated in the very method of calculating eco-balance. We therefore think that this concept should absolutely be taken over by the leftists, no matter what political consequences the Wuppertal Institute, for example, draws from it.

With regard to the emission of carbon dioxide, the most important of the greenhouse gases (it is responsible for 50% of the greenhouse effect), it means in concrete terms the following: Globally, roughly more than two times as much CO₂ is being emitted as the earth can absorb through its CO₂-sinks (the oceans, large forest areas etc.). That means, in order to stop the greenhouse effect, the global CO₂ emission must be halved immediately. It is clear that that is not possible. Therefore we can only try to weaken the greenhouse effect to such an extent that civilisation and vegetation can adapt themselves quickly enough, that it, above all in the interest of its victims in the Third World, remains controllable. One generally assumes that that is still possible if the rise in the average global temperature remains limited to 0.1 degree Celsius per decade. On this basis, renowned scientists set the global reduction goal at 50 to 60 percent of the 1990 level by the year 2050. But since the rich industrial countries are responsible for a much higher CO₂ emission than the world average, the reduction in these countries must be correspondingly drastic. In terms of these criteria, in Germany, for example, the CO₂ emission must be reduced by 90% by the year 2050. It must be stressed here that these reduction goals state just the minimum that is ecologically necessary; the factual reductions should not fall below this.

We must also consider the possibility that a positive feedback takes place in the course of global warming. That means, the negative effects of global warming may reinforce each other, leading to an uncontrollable dynamics. An example thereof is the possible release of large amounts of methane through the eventual thawing of permafrost in Siberia (the greenhouse potential of methane is many times higher than that of carbon dioxide.)

The ecological U-turn is therefore directly a question of global justice. The production and consumption level of the industrial countries cannot be universalised. For example, in North-Rhine-Westphalia (a province of Germany) alone, more cars are registered than in the whole continent of Africa; and merely 6% of the world population can afford the luxury of flying (Air traffic makes a considerable contribution to climate change). Then there are also the problems directly resulting from production and consumption in the industrial countries, problems with which the majority of the people of the Third World are saddled. We can mention, for instance, the negative effects of uranium mining in Niger or the soil erosion resulting from export-oriented agriculture.

If we do not want to disregard this global horizon, then we cannot avoid the insight that the people of the industrial countries, but also the rich and the middle class of the Third World, with their ecologically unsustainable mode of production and way of life, are participating in a worldwide chauvinistic selection process, which robs others of their chances of survival. For leftists, the ecological U-turn must therefore stand at the top of their political agenda. The acceptance of drastic changes in the way of life and consumption patterns, which would necessarily result from such a U-turn (especially in the rich industrial countries), can however be best achieved through an egalitarian reorganisation of society.

THE ILLUSION OF SUSTAINABLE CAPITALIST DEVELOPMENT AND THE NECESSITY OF ECO-SOCIALISM

Development, or economic growth, has since long been seen as the key element in the resolution of two old conflicts: that between the rich and the poor in every society and that between the nations of the North and the South. In the late 1960s, however, some doubts arose. The contradiction between industrial economy and ecology could no longer be overlooked. Nevertheless, even after Meadows et al. (1972) and some others had pointed out the limits to growth, governments throughout the world continued with the same economic policies as before, while establishment economists brought forward many arguments to deny both the existence of any limits to growth and any contradiction between economy and ecology. But since about the mid-1980s, most establishment economists, politicians and political thinkers have been compelled to concede that there is a problem; it has become impossible for them to ignore global ecological degradation any longer. Some among them have realized that they cannot carry on as before, but they are not prepared to change course substantially, and they cannot, for reasons I shall elaborate below. So they invented a new term; they are no longer preaching development and growth, pure and simple. They are now preaching “sustainable development” or “sustainable growth”.

But not only the establishment, also many of those who are fundamentally critical of the neoliberal world economic system and denounce its various negative effects on people and environment – e.g. critics of globalization, trade unionists etc. – do not in principle question the growth paradigm of capitalism. They make many detailed proposals for improvement of individual aspects of the economy, e.g. abolition of the tax havens, introducing a Tobin-tax (a tax on international financial transactions to curb destructive speculation), remission of external debts of the poorest countries etc. etc.. But they basically remain rooted in Keynesianism, which cannot resolve the contradiction between the growth compulsions of capitalism and the imperative of conservation of our natural basis of life. On the contrary, Keynesians hope that state-sponsored boosting of the economy by means of enhancing mass purchasing power would lead to more consumption of goods and services and to more employment, which in turn would increase the tax revenue of the state, which is allegedly necessary for solving the ecological problems. They do not realize that increasing consumption of goods and services leads to increasing depletion of scarce resources and causes increasing environmental pollution.

In the 1950s and 1960s the overwhelming majority of economists and economic policy makers were adherents of Keynesianism. Nonetheless, let us remember, for the majority of human beings the world was then still not a good place. Only in a few countries of the North there was less poverty and less unemployment, perhaps also a little less exploitation. As to the underdeveloped countries of the South, most of them were left to the dynamics of capitalist development financed largely through foreign debt –very often with devastating social and ecological consequences. But in the developed countries of the North, the growth dynamics of the capitalist world economy did not tolerate Keynesianism for long.

The majority of the critics of globalisation think that most evils of the present-day world are caused by bad policies dictated by multinational corporations. From this simplistic analysis follow false concepts and ideas for solution of problems. They think, if the dominance of the multinational corporations and neoliberal economic policies could be overcome, then it would be possible to create prosperity for all people of the world. A fundamental error of these good people is to ignore the question of the natural resource base of an economy and the limited capacity of nature to absorb or neutralize the pollution generated by industry. In contrast to such critics of globalisation, the International Forum on Globalisation, which is also an organisation that rejects globalisation, writes:

“... globalization is inherently destructive to the natural world because it requires that products travel thousands of miles around the planet, resulting in staggering environmental costs such as unprecedented levels of ocean and air pollution from transport, increased energy consumption and fossil fuel emissions (furthering climate change), increased use of packaging materials, and devastating new infrastructure developments – new roads, ports, airports, pipelines, power grids – often constructed in formerly pristine places.” (IFG 1999: 19)

This principled opposition to economic globalization is a necessary consequence of the recognition of limits to growth. For continuing globalization tends to accelerate economic growth, which progressively degrades the natural environment.

Three Illusions

It doesn't make any difference whether the protagonists of further economic growth are consciously deceiving people or are only suffering from delusions. The result is the same. Three illusions form the basis of the thinking that ignores or covers up the fundamental limits to growth:

First, in the early phase of the controversy, some economists denied that there was any resource problem, even in respect to non-renewable resources. Prof. Wilfred Beckerman (1972), then head of the department of economics at the University of Oxford, very confidently asserted that there were enough resources in the world to sustain continued economic growth for the next 100 million years (see in this connection also Simon and Kahn 1984). Others believed that all scarce raw materials could be substituted by more abundantly available materials such as iron and aluminium. Some even believed that we could produce plastics by processing carbon dioxide in the air (Daublebski 1973). As recently as 1993, the president of the Japanese Council of Sciences, Prof. Jero Kondo, suggested that, in order to solve the problem of global warming, both the undesirable excess of carbon dioxide in the air and that escaping through the chimneys should be captured by using solar energy and converted into useful industrial chemicals (cf. Schmidt-Bleek 1993: 80). Such is the degree of delusion that has infected the discourse on sustainable development/growth.

This primitive form of illusion is no longer popular. Since about the mid-1980s, some protagonists of sustainable development believe that, thanks to developments in science and technology, economic growth can continue in spite of drastic reductions in resource consumption (WCED 1987) or that at least the present-day standard of living in the industrial societies can be more or less maintained through "a new model of prosperity" (cf. Weizsäcker 1994; Schmidt-Bleek 1993; Friends of the Earth Netherlands 1992).

Second, again on the basis of naive faith in the development of science and technology, most of them believe that the pollution problem can be solved if only we devote sufficient resources to this task.

And third, all of them believe that their goal can be achieved within the framework of a capitalist market economy.

The Reality

Here one has to be sceptical. In the following we shall examine the above assertions and hopes and explain why we think that they, and also their more sophisticated variants, are illusions.

The issue of resources

Let us ignore people like Beckerman, Simon and Kahn, who do not even consider it necessary to advocate sustainable development. But even some of those who demand that resource consumption should be drastically reduced think that the main problem is not that of resource scarcity, at least not in the foreseeable future, but that of environmental degradation (e.g. Schmidt-Bleek 1993: 48). For instance, some assert that shortage of energy is not the problem; the real problem is global warming. In the 1990s, there was indeed no resource scarcity. Prices of raw materials including oil were low and falling. Even today, when these prices are rising rapidly, Western Europeans and North Americans can afford them. But simply because they can afford all the resources, they should not think that there is no resource problem at all. That would be a gross error. In many countries of the South, resource shortage is already a big problem – e.g. in respect of availability of arable land and fresh water. In Nigeria, an oil-exporting country, petrol is such a scarce commodity that many Nigerians bore holes in pipelines to steal a few buckets of the fuel and risk their life in the process. Because the poor of the world do not have the money to go to the world resources markets as purchasers, most economists are not aware of the problem.

Nevertheless, the proponents of sustainable development have realized that general environmental degradation is directly proportional to overall resource consumption. So they think, to protect the environment, it is necessary to reduce resource consumption drastically. And they think that is possible without having to sacrifice economic growth or the western standard of living. In 1987, the authors of the so-called Brundtland Report claimed to have noted “favourable trends” that allegedly proved that “future patterns of agriculture and forestry development, energy use, industrialization, and human settlements can be made far less material-intensive, and hence both more economically and environmentally efficient” (WCED 1987: 89f.). In chapter 8, entitled Industry: Producing More With Less, it cites some supporting data from the 1960s to the middle of

the 1980s. Since the beginning of the 1980s, we have been hearing of an “efficiency revolution” that is expected to increase the resource productivity of industrial economies through technological progress. More recently, in their book entitled *Factor Four – Doubling Wealth, Halving Resource Use*, Weizsäcker et al. (1997) gave many examples of particular products to show that such an efficiency revolution had already begun.

Other researchers, however, focused on macro-economic data instead and noted a contrary trend. F. E. Trainer (1985: 211) cites comparative data from the post-war period till the end of the 1970s to prove just the opposite, namely that returns to technology in the form of resource productivity are in general going down. Dennis Meadows, author of the 1972 study *Limits to Growth*, corroborated this in 1998 when he said in an interview: “We already have to spend more and more on capital investment to get access to the raw materials” (*Die Zeit*, 19 February 1998). For example, between 1963 and 1977, annual investment in the US mining industry increased by 130 per cent (in constant dollars), but output measured by tonnage increased only by 38 per cent (Trainer 1985: 51). In industrialized agriculture, more and more chemical fertilizer and non-renewable energy have to be used to produce the same quantity of grain. In 1950, the use of one additional tonne of fertilizer yielded an average of 14.8 additional tonnes of grain, but in 1980 this additional grain yield figure fell to only 5.8 tonnes (Brown 1984: 179). More recently, Fred Luks (1997) calculated that if, in the industrial countries, resource consumption in the next fifty years is to go down by a factor of 10, as demanded by Schmidt-Bleek (1993) and many others (e.g. Loske et al. 1998), and the economy is to grow simultaneously at the rate of 2 per cent annually, then resource productivity in this period must rise by a factor of 27. How realistic is that?

Explaining the economic difficulties of the former Soviet Union, Abel Aganbegyan, then chief economic adviser to Gorbachev, wrote in 1988:

“In the 1971–75 period, the volume of output of the mining industry increased by 25% but only by 8% in 1981–85. This decline in growth ... was mainly connected with the worsening of the geological and economic conditions of mining The Soviet Union is fairly rapidly exhausting the most accessible of its natural resources . To maintain levels of extraction it is necessary to dig deeper, to discover new deposits and to transfer [move] to less favourable fields. The fuel and raw materials base in the inhabited regions ... is already unable to meet our requirements ... It is necessary therefore ... to construct

transport links, to create new towns and develop territories and attract population there. All this, naturally, does not come cheap." (Aganbegyan 1988: 8)

Actually, common sense is enough to understand this. No doubt, stopping wastage alone increases resource productivity. And occasional ingenious inventions and innovations can also raise it in some particular technologies. But normally, sooner or later, all technologies attain their optimum. Thereafter, the law of diminishing returns comes into operation. We may invest as much as we want in research and development, but we will never be able to produce a car engine that does not need any fuel. We cannot wish away the laws of physics, chemistry and biology. In short, also in the matter of resource productivity there are limits to growth.

In the past, technological progress was driven by two "motors": the intellect and abundant use of resources, especially of fossil fuels. A pneumatic hammer, for example, which is far superior to an ordinary hammer in terms of performance, embodies not only many high-class inventions, it also requires many more resources for its production and operation than the latter. But the idea of sustainable development stipulates that total resource consumption in the advanced industrial countries be drastically reduced – that one forgoes, so to speak, the use of the second "motor". Of course, much can be achieved with only the first "motor". Mainly through the work of intellect has the computer become smaller and more efficient. Yet, to produce a small personal computer, 15–19 tons of material have to be processed (Malley 1996). Moreover, one cannot live in a computer and eat data.

A few isolated successes can delude us about the overall situation. A motorcar today needs less petrol per kilometre than it did, say twenty years ago. But the US oil industry today must consume more energy and materials to extract oil in Alaska and transport it to the consumers than it had to do for Pennsylvanian oil. As a result, its energy input-output ratio is worsening.

Let us look at the so-called energy-efficient cars. They require for their manufacture much more energy than ordinary cars. Volkswagen Corporation has developed a car that consumes only 3 litres of petrol per 100 km. It has been made lighter by using aluminium and magnesium. For producing these light metals, much more energy and materials have to be consumed than for producing steel. "All people are only staring at the fuel consumption and are not noticing at all how they are causing the gigantic

merry-go-round of raw materials consumption to rotate ever faster. ... That simply will not work" (Schmidt-Bleek quoted in Wille 1999). This statement on the 3-litre car applies all the more to the promised 1-litre car.

As regards biofuels and liquid hydrogen as substitutes for petrol, diesel or compressed natural gas, one ought to consider first how much more energy and other resources have to be consumed to produce these substitute fuels for cars before one bursts into euphoria.

Limits to Recycling

There are also limits to recycling. Of course, metals can, in many cases, be recycled easily, but they are often used in such a dissipative way (e.g. zinc in paint) that no recycling is possible. In many other cases, recycling is in principle possible but would require too much energy and materials consumption to be economic. On average, according to a report to the Club of Rome, about 70 per cent of the annual production of metals are lost after one use only. Of the rest 30 per cent that are recycled, only 0.1 per cent remains in use after ten "life cycles" (Gabor et al. 1976: 144f.). Of course, the recycling rate can be improved through technological development, and rising prices can certainly help. But recycling can only postpone the problem, not solve it.

The Myth of Information Society and Service Society

We often hear researchers say that in the advanced industrial societies economic growth has been decoupled from growth in resource consumption. Indeed, in the early 1980s it was pointed out in support of the above view that in the USA 60 per cent of all employed people only processed information in some form or other (Naisbitt 1982: 14). All such statistics are supposed to prove that sustainable growth is possible. But, firstly, the concept "gross domestic product" (GDP) is highly problematic because fictitious transactions, even disasters, and money spent on repairing damages are included in it. Secondly, we should not overlook the fact that the old branches of the economy that require high energy and raw materials consumption can be and are in fact being transferred away from the advanced industrial countries to developing and East European countries. The advanced industrial countries can then grow more through sectors such as banking, insurance, data-processing, research and development,

selling and licensing of patents etc. than, say, through mining and steel production. But it is a zero-sum game. This way, of course, their balance – namely the ratio of energy and raw materials input to GDP – may look better, but the balance of the world economy remains unchanged. The same applies to environmental degradation. Improvements in the environment of the rich industrial countries are more than cancelled through increase in environmental degradation in, say, China, which has now become the biggest factory of the world.

What is more important, if we cease to stare only at the production side and also consider the consumption side, the balance of the highly developed economies would appear very bad. For one unit of need-satisfaction (say, quenching thirst), a data-processing US-citizen consumes many times more resources (Coca-Cola in a can) than an average citizen of India (a glass of water from the tap). This has also been realized by the authors of the Brundtland Report. They write: “... even the most industrially advanced economies still depend on a continued supply of basic manufactured goods. Whether made domestically or imported, their production will continue to require large amounts of raw materials and energy” (WCED 1987: 217).

Environmental Protection Through Technological Fixes

The realization that resource consumption must be drastically cut in order to protect the environment and to conserve the natural basis of life is quite recent and not very widespread. Most people, even many environmentalists, do not see the connection. They believe, what is needed to protect the environment is simply to devote a larger portion of the expected, and normally growing, GDP to this task, i.e. to invest more in conventional environmental technologies. The more modern among them demand that the state and industry invest large amounts of money in research on and promotion of renewable resources, which are held to be absolutely clean. They believe that renewable resources can fully replace all the non-renewables we consume today. We shall examine the latter belief in the next section. Here we point out the fallacies of the former.

It is conceivable that in the initial phase of a new technology (or a new branch of industry), negative environmental impact per unit of production can be reduced through its further development – through new ideas and without requiring more resource consumption. But as in the case of resource consumption per unit of production, so also in the mat-

ter of negative environmental impact, at some point the optimum will be reached, and the technology will attain maturity. After that, increases in production will be accompanied by proportional or even over-proportional increases in environmental degradation. The conventional technological environmental protection policy is not oriented towards the overall ecological context. It is limited to selective and peripheral measures, which can provide only short- or middle-term relief in respect of particular problems. In most cases, they only shift the problem. Pollutants are shifted from the medium air into the medium water or ground, or the other way round. Or they are thinly distributed over a large area, e.g. through very high chimneys. Or they are diluted by adding fresh air or water. Or they are only intercepted, collected and dumped somewhere, often in Third World and Eastern European countries. In the long run, and from a global standpoint, such "successes" are of no use. This is common knowledge among those who are in charge of executing this policy. For example, in 1976, the then president of the West German Federal Bureau of Environment, Heinrich von Lersner, characterized his job as "a Sisyphian task". He said: "By the time we have brought one pollutant under control, another one has become a problem" (Der Spiegel, No. 40, 1976, p. 62).

Filters and other equipment used in technological fixes for environmental protection are all industrial goods. Their manufacture and operation require, as with all industrial products, considerable expenditure of energy and other resources. That also causes pollution (and resource depletion), only somewhere else and of some other kind. For example, sulphur dioxide emissions (cause of acid rain) from a thermal power plant can be largely eliminated, but that requires a chemical plant that consumes 3 per cent of the electricity production of the power plant. That would mean that more coal would have to be burnt, which would entail more carbon dioxide emission. Someone who has understood this would also realize that the recent fashionable talk about an emission-free car driven by hydrogen fuel cells is just a bluff. The production of both hydrogen and fuel cells generates a lot of pollution, only somewhere else. Moreover, filters and similar other equipment have a limited lifespan. They must be replaced every ten, fifteen or twenty years. Technological environmental protection thus becomes a regular industry, causing more resource depletion and more pollution.

The Search for Renewable Resources

Many environmentalists believe that renewable resources are potentially so abundant that all the current consumption needs of all humanity could be easily met. Hermann Scheer, president of Eurosolar, and a famous apostle of a "solar world economy" writes: "For an unimaginable length of time the sun will be bestowing its energy on humans, animals, and plants. And that in such a prodigious quantity that it would be able to meet the most sumptuous energy needs of even drastically growing populations of humans, animals, and plants (Scheer 1999: 66).

Scheer and thousands of solar energy enthusiasts derive this hope from the fact that every day the sun supplies the earth with 15,000 times as much energy as the total daily commercial energy consumption of the human population at present. Under the term "solar energy" they nowadays subsume all sources of energy except the fossil, nuclear, and geothermic ones: the energy of sunshine, wind energy, energy of flowing water, energy from biomass etc. Some of them believe that from biomass we could also get raw materials for almost everything: houses cars, every kind of chemical, and so on. And all such materials could finally be composted (Alt 1993: 6–8).

Now, if all this is true, why have we not yet been able to solve all the resource and environmental problems of humanity? Why are the prices of all conventional non-renewable resources – oil, gas, coal, electricity, metals, wheat, rice etc. – rising rapidly for the last few years? (see appendix II & III). After all, generating electricity by means of photovoltaic technology was invented as early as in 1954, biomass energy is being used since time immemorial, wind energy for a few thousand years, and the energy of flowing water for many centuries. It is therefore necessary to examine the above beliefs.

For the conversion of sunshine, wind, biomass etc. into electricity and liquid fuel we need industrial equipment and a whole infrastructure, the production and operation of which require consumption of large quantities of non-renewable energy and non-renewable resources. And they cause a lot of environmental degradation too.

Let us take the case of sunshine. It is, of course, quantitatively a rich source of energy. The point, however, is to make it available in the desired forms at desired places, namely as electricity and liquid fuel in the inhabited regions of the earth. So far, despite great efforts in research and development, solar electricity is not cheap enough to replace electricity from fossil

fuels and uranium. The production cost of electricity from coal in Central Europe is about 0.04 Euro per kilowatt-hour. Statements on the production cost of photovoltaic electricity in Central Europe vary from study to study. But all studies agree that it is still much too high to be competitive, roughly 10 to 15 times as high as that of coal-based electricity.

Moreover, to be available round the clock, both solar and wind-electricity have to be stored in some form or other, because the sun does not shine in the night and on cloudy days, and wind does not blow always. The most advocated storage technology is to produce liquid hydrogen from water with the help of solar and wind electricity. But if the exorbitantly costly solar electricity (or even the not so exorbitant wind electricity) is used to produce and liquefy hydrogen, which would be reconverted to electricity, how much would the latter electricity cost? Liquid hydrogen has also been suggested as fuel for cars and aeroplanes but has not been marketed because of its high cost.

But it is not just a question of price. People may be willing to pay a higher price to protect the environment. If we produce only energy (electricity) by using energy (electricity), then it only makes sense if the output is more than the input, in other words, if the energy balance is sufficiently positive. It is very doubtful that it is so in the case of photovoltaic technology. (see appendix V). The reasons for this scepticism are as follows:

At present the lifespan of a photovoltaic module is at the most 20 years. Statements on the energy pay-back time of this technology – that is the time a photovoltaic module needs to produce the amount of energy that was needed to manufacture and install it – in Central Europe range between 1.2 and 10 years. This incredibly wide range alone gives rise to doubts about the seriousness of the calculations (for details see Sarkar 1999: 103–110). There are reasons to doubt that the photovoltaic enthusiasts have really added up all the energy that goes into the production of a photovoltaic module at different stages. Nicholas Georgescu-Roegen (1978) was the first to raise this doubt. In order to determine the correct and complete energy-input figure, Georgescu-Roegen wrote, one should add up all proportionate expenditures of energy, beginning with the energy that was needed to build the factory that produced the excavator that was used to dig up sand that was used to produce silicon, and so on. This is standard procedure for calculating the money cost of production of anything. But this is obviously not done when calculating the energy cost of production of 1 kWh of photovoltaic electricity (which is admittedly much more difficult to do). That explains the astonishing discrepancy between

the high money cost of production of photovoltaic electricity and its alleged low energy cost of production (energy pay-back time). If we accept Georgescu-Roegen's method, then we would likely come to the conclusion that the energy balance of photovoltaic or any other technology for converting sunshine into electricity is negative. And that perhaps is the reason why not even in a pilot project has it been tried yet to produce all the components of photovoltaic modules, from A to Z, by using photovoltaic electricity instead of conventional electricity.

Georgescu-Roegen differentiates between "feasible" and "viable" technologies. Technologies for converting sunshine into electricity are feasible, but not viable, because they cannot reproduce themselves. They can only exist as long as conventional energy can be used for producing the necessary equipment. That means they are parasites. Georgescu-Roegen illustrates the point with the following example: The first bronze hammer was made by using stone hammers. Thereafter, all bronze hammers were hammered by bronze hammers. He thinks, the problem might be beyond solution. Because the energy intensity of sunshine on the surface of the earth is very low – and that is a cosmological constant beyond our control – a large area must be covered with collectors (photovoltaic modules or aluminium mirrors) to gather and concentrate this energy. That requires a large expenditure of energy (and materials) and makes the energy balance of such technologies negative. In contrast, fossil fuels are solar energy that has already been collected and concentrated by nature over millions of years, which is the explanation for their high energy intensity and highly positive energy balance.

Suppose we accept the claim of some enthusiasts that the energy pay-back time of photovoltaic technology is seven to ten years. Will that – after meeting all or a part of our other energy needs – leave us with enough surplus energy for running all the industries necessary to reproduce the photovoltaic power plants every twenty years? We doubt very much that it will. The expected technological breakthroughs may or may not come. In any case, we cannot place our hopes at present on an elaborate vision of "a solar world economy" (Scheer 1999) on the basis of that expectation.

Wind-, water-, and biomass-energy have proved their worth in the past centuries. Of course, an industrial society needs electricity and liquid fuel, not just mechanical and heat energy. But the fact that the cost of production of wind- and biomass-electricity in Central Europe is on average roughly 0.085 and 0.10 Euro respectively indicates that their energy balance is very likely to be positive. But it may not be positive enough to enable these

technologies to be viable (to reproduce themselves) in the sense elaborated above – i.e. without the aid of fossil fuels (see appendix V).

Since a few years ago, biofuels – bioethanol and biodiesel from maize, sugarcane, palm-oil, rape-seed-oil etc. – are being advocated and produced on a large scale in the name of stopping global warming. But much doubt exists about their energy balance, because cultivation of the said crops requires a lot of fossil fuels for driving the agricultural machines and producing fertilizers and other chemicals. In the case of ethanol produced from maize and biodiesel from rape-seed-oil, many researchers are of the opinion that their energy balance is negative. The cultivation of oil-palm in erstwhile rainforests of Indonesia and Malaysia has wreaked ecological havoc in the region. The most serious objection to biofuels is, however, that land needed for food production is thereby diverted to fuel production for motor vehicles. As a result of large-scale ethanol production from maize, tortilla, the maize-bread of the Mexicans, has become exorbitantly costly. This fact alone, if not also the others, will limit the production of biofuels (see appendix II). Moreover, also the other species of the planet need land for their survival.

Taking all these things into consideration (for a detailed discussion see Sarkar 1999: ch. 4), it seems safe to predict that in a future sustainable economy neither energy nor raw materials will be as cheap as today, nor will their availability be as great as the sum total of all the non-renewable and renewable resources available today. The need to reduce resource consumption drastically will be compelling, not only for protecting the environment but also because there simply will not be enough to maintain today's average standard of living for a world population of 8–10 billion, the figure forecast for the year 2050. The world economy as a whole must therefore shrink. Resource consumption of the advanced industrial countries must, as Schmidt-Bleek (1993) demands, go down by a factor of ten if the people of the whole world are to get a chance to satisfy their basic needs.

Sustainability

The conclusion that must be drawn from the above exposition of reality is that sustainable development (growth) is not possible, unless we understand by the term “development” something other than industrialization, economic growth and industrial society. Herman Daly and John B. Cobb Jr. (1990: 71) differentiate between growth and development: “

‘Growth’ should refer to quantitative expansion in the scale of the physical dimensions of the economic system, while ‘development’ should refer to the qualitative change of a physically non-growing economic system in dynamic equilibrium with the environment.”

In other words, “growth” means using up more and more resources, whereas “development” means to increase the benefits derived from the use of the same quantity of resources. Of course, we can say that the economy should grow, like a tree, up to a certain point and not beyond that. Daly and Cobb Jr. (ibid: 72) write: “Any physical subsystem of a finite and non-growing earth must itself also eventually become non-growing. Therefore growth will become unsustainable eventually and the term ‘sustainable growth’ would then be self-contradictory. But sustainable development does not become self-contradictory.” This is all correct. But isn’t it then better and clearer to speak of a “steady-state economy”, as Daly does in an earlier book (1977), rather than of sustainable development?. Or we may also speak of a sustainable economy or a sustainable society. Actually, in the whole of economic thought, a paradigm shift is necessary – a shift from the hitherto dominating growth paradigm to what we call “the limits-to-growth paradigm”.

A sustainable society is, by definition, “one that can persist over generations” (Meadows et al. 1992: 209). Consequently, it cannot have as its foundation an industrial economy as we know it, because such an economy is for the most part dependent on the use of vast quantities of non-renewable resources, which will be exhausted sooner or later. Logically therefore, the economy of a sustainable society must be based, – if not wholly, then at least for the most part – on the use of renewable resources. Non-renewable resources would then be used very frugally or, better, only when absolutely necessary.

It goes without saying that a sustainable society would cease to be sustainable if its population continues to grow. Since there is no empty country left any more in the world, it cannot send its excess population as colonists to other continents. Consequently, a sustainable society would also require that its population remains steady at the optimum level. Since the present-day world population has already far exceeded the population that can live sustainably on the earth, it is imperative that the world population as a whole be reduced, in the long run. The work for stopping population growth must begin today.

The consumption level in such an economy would be very modest in comparison to that of an average citizen in the First World of today. Such

an economy would prefer labour-intensive technologies. That would, firstly, be necessary because the quantity of sustainably available renewable resources would not allow us to maintain the present level of mechanisation and automation. Secondly, that would also be desirable, because this way meaningful employment can be created for all. For ecological reasons and because of scarcity of resources, long-distance trade would also be drastically curtailed (see IFG-quotation above). That would entail the creation of regional, largely self-provisioning, and ecological-cyclical economies.

A steady-state economy not subject to any growth compulsion should not be misunderstood as leading to stagnation in respect of human development:

“It is scarcely necessary to remark that a stationary condition of capital and population implies no stationary state of human development. There would be as much scope as ever for all kinds of mental culture, and moral and social progress, as much room for improving the Art of Living and much more likelihood of its being improved”
(John Stuart Mill, quoted in Daly 1980: 15)

All the conditions of sustainability discussed until now mean that at least the economies of the industrial societies must shrink in order to become sustainable. They must become steady-state economies at a much lower level than today. As for the countries of the South, including also the rapidly industrializing countries like India, Mexico, Egypt etc., the most important condition of sustainability there is to stop population growth. That is also an important condition for ensuring that enough space remains for habitats of the other species. The question whether or not further growth of the economies of these countries is acceptable, should be answered carefully and in a very differentiated manner.

Will all that be possible within the framework of capitalism? All protagonists of sustainable development believe it will be. But that is a misconception. We think it is impossible.

Eco-Capitalism Cannot Help Us

One of the articles of faith of capitalism is that the welfare of society will result automatically if everybody cares for his/her interest only (Adam Smith). It is of course true that in the last 200 years, capitalism has, in most capitalist countries, steadily increased wealth. But, as everybody knows,

that has not always led to prosperity for all, nor to welfare of society as a whole. Particularly in respect of conservation of the natural basis of life and social peace, it has had the opposite effect. Moreover, capitalism limits the time horizon of the participants in the economy to their own short lifespan. At the most, it allows them to think of the interests of their own children. But the project of creating a sustainable human society demands of us that we care for the welfare of all coming generations and of all peoples of the world. This is incompatible with the spirit and functioning of capitalism. The aphorism "What has posterity done for me that I should do something for it?" is not a joke, but corresponds exactly to the mode of operation of capitalism.

The most serious defect of capitalism that is the cause of its unresolvable contradiction to sustainability is its growth dynamics. It is not just that the greedy capitalists want to have more and more. Brutal competition also compels them to try to earn and accumulate/invest more and more. "Expand or perish" is an inexorable law of capitalism. Since no entrepreneur wants to perish, it generates a growth compulsion. Because of the ever larger investments that they are compelled to make to remain competitive, they must search for and create ever larger markets. In capitalism, all firms can make a profit only if the economy as a whole grows. The satisfactory functioning of a capitalist economy is so strongly dependent on continuous growth that even a growth rate below 2% is perceived as a crisis. But sustainability, as we have argued above, requires economic shrinking. Capitalists are willing to contribute to environmental protection by producing more and more filters, sewage treatment plants and so on, but they can never be interested in any kind of shrinking of the economy.

It is astonishing that many theorists of sustainable development, e.g. Schmidt-Bleek (cf. Wille 1999), believe that economic growth will be possible in spite of a drastic reduction in resource consumption. With a favourable interpretation, one might say that they are confusing increase in benefits with economic growth. Daly and Cobb's differentiation between growth and development quoted above comes close to what I mean. If, for example, the quality of the air improves because fewer resources are being consumed, then, of course, people would benefit from that. They would enjoy the better air and would no longer fall sick as often as before. But capitalists as capitalists are not interested in such growth in benefits to society; they are only interested in increasing their sales so that they can make more profit. Increase in sales can result either from selling more goods and services or from charging higher prices for less goods and serv-

ices sold. But competition generally makes it very difficult for any entrepreneur to make more profit by selling less at a higher price. Long-lived and easily repairable products are therefore, generally, of little interest to entrepreneurs. Built-in obsolescence is therefore rational policy in capitalism.

Any policy of drastically reducing resource consumption, which is ecologically necessary and inevitable in the long run, would, firstly, entail a massive redundancy of plants and equipment and destruction of financial capital (share value) in the mining industry. That would then, secondly, lead through a chain reaction to a general crisis in the economy. What factories, machines and workers in all other branches of the economy actually do is to transform raw materials and energy into goods and services, which are sold at a profit. If they are now allowed to process only one-fourth or one-tenth of the hitherto processed quantities of raw materials and energy, as some protagonists of sustainable development demand (Weizsäcker et al. 1995; Schmidt-Bleek 1993), then a proportional quantity of factory and machine capacity and a corresponding part of the labour force would become superfluous. The end result of all that would be a great depression.

Competition also results in the compulsion to increasingly automate and rationalize production. A firm that does not do this will perish. That is why it is not possible to solve the problem of unemployment within the framework of a capitalist economy – not even if it is growing, let alone if it is compelled to stop growing or shrink.

Also the on-going dismantling of the welfare state is the result of a particular kind of competition: In the context of globalization, industrial locations compete with those in other countries to woo transnational capital. Without questioning this system, we cannot halt or even credibly protest against this “race to the bottom”. Also societal sustainability is impossible within the capitalist system.

Conclusion: Eco-Socialism for a Sustainable Society

Eco-capitalism is, therefore, a misnomer, a self-contradictory term. We cannot have both ecological sustainability and the growth dynamics of capitalism. Whatever fiscal, financial or direct regulatory tools governments might choose to use – green taxes or tradable pollution certificates or depletion quotas –, a shrinking capitalist economy would mean a catastrophe for the whole society, a never-ending great depression. Moreover, no capitalist can willingly accept a low-level steady-state economy. Therefore, the state must take up the task of organizing the retreat. It must be a

planned retreat, otherwise there will be terrible chaos and calamity. The state must overrule the primacy of profit and growth compulsion.

That means, an economic framework-plan must take the place of the chaos of a free market economy. Society must consciously reach an agreement on what, how much and how to produce, how much energy and how many resources are to be allocated to what. All that is also necessary to ensure that nobody who is fit for work is unemployed and must therefore live off the labour of others. In addition, a large degree of equality in respect of distribution of the products of social labour as well as in respect of the necessary sacrifices in consumption would be necessary, so that the process of economic shrinking is accepted by the majority of the people. All that would necessitate the nationalisation or socialisation of all large enterprises. In principle, a multiplicity of forms of socialisation and ownership of the means of production is conceivable – state ownership, co-operatives, even private ownership of small business. However, finance capital (banks and insurance companies) and the greater part of the means of production must no longer remain under private control.

In order to ensure that an eco-socialist society does not become an authoritarian one, suitable forms of active popular participation at all levels must be created. Since the economic regions would be small – or of a manageable dimension – and largely self-provisioning, the political units would also be small or of a manageable dimension. So it can be made possible that the concerned people are included in the decision-making process.

A socialist society is not only a necessity that arises from the growing scarcity of resources and the imperative of conservation of the natural basis of life, it is also desirable if we consider equality, justice, co-operation, solidarity and freedom to be highly important values. A solidary and peaceful coexistence of individuals and the peoples of the world requires an eco-socialist society, in all countries of the world.

APPENDICES

In support of our analysis and views expounded in the foregoing pages we are presenting below summaries of and/or excerpts from texts that have been written by authors who cannot be suspected of being anti-capitalists.

I. The Climate Study of the Pentagon

Until very recently, in contrast to the general consensus prevailing among the world's leading climate scientists, the US-government had been insisting that the grim prognoses about impending devastating climate changes were not based on indubitable scientific evidence. That had been its argument for not undertaking anything to reduce the emission of greenhouse gases. But in February 2004, the online edition of the German newsmagazine *Der Spiegel* published a summary of the conclusions of a study made by scientists of the US War Ministry (The Pentagon), which more than echoes the warnings and fears of the majority of the climate scientists (*Spiegel Online*, 22 February 2004; under <http://www.spiegel.de/politik/ausland/0,1518,287518,00.html>). Below we give our summary of the report of *Spiegel Online*:

One of the most astute thinkers of the Pentagon (the leader of the study group) is warning in a stirring study that climate changes endanger the security of the USA more than terrorism.

The scenario is threatening as well as realistic: Within the next few years, the enormous quantities of fresh water released through the melting glaciers and polar icecap could cause the Gulf Stream to lose strength, change direction and collapse suddenly and totally. Icy winds would blow across North Europe. Scandinavia would be transformed into an ice desert. The forests would die, the plains on the North- and Baltic Sea would freeze and become Tundra. Elsewhere, there would be devastating droughts, e.g. in the south of the USA, and devastating storms and floods would ravage vast areas, especially the coastal areas. Densely populated coastal states such as Holland and Bangladesh would be inundated. Millions of hungry refugees would leave their native country and force their way into rich countries.

The climate changes would drive people and governments in dire straits. Oil would become scarce. The alliances for peace and security

would erode. Bloody conflicts would break out. Wars for raw materials and food would ravage the continents.

Countries with unstable governments like Pakistan or Russia could be tempted to use their nuclear arsenal in order to obtain food and raw materials by force. Within a few years the world could be driven to the verge of total anarchy. As soon as the world climate tilts, and that may happen soon, wars would dominate the life of human beings.

The concluding advice of the authors of the study to the US government: it should not see climate change only as a scientific debate, but as a serious threat to the country's security.

II. Food Versus Biofuels

All over the world, authorities are promoting the production and use of biofuels, which are being claimed to be an alternative to fossil fuels and which supposedly do not cause any emission of greenhouse gases. Below, we reproduce a short article from The Times (London), dt. 7 March 2008, which criticises biofuels on another score:

“Biofuels ,are global threat’ “

“Billions will be at risk from food shortages“

“UK and UN experts forecast soaring prices“

“A headlong rush towards biofuels is threatening world food production and the lives of billions of people, the British government's chief scientist said yesterday.

Prof. John Beddington, ... described the potential impacts of food shortages as the ,elephant in the room' and a problem which rivalled that of climate change.

His warnings came as the head of the UN World Food Programme (WFP) told the European Parliament that the rise in basic food costs could continue until 2010. Josette Sheeran blamed soaring energy and grain prices, the effects of climate change, and demand for biofuels.

Miss Sheeran has already warned that the WFP is considering plans to ration food aid due to a shortage of funds. Some food prices rose 40 per cent last year, she said. The WFP fears that the world' poorest will buy less food, less nutritious food, or will be forced to rely on aid.

Speaking at a conference on sustainability ... , Prof. Beddington said: "It's very hard to imagine how we can see the world growing enough crops to produce renewable energy and at the same time meet the enormous demand for food. The supply of food really isn't keeping up.' By 2030 the world population will have increased so dramatically that a 50 per cent increase in food production will be needed, he said. By 2080 it will need to double.

In the drive to replace conventional fuels with allegedly environmentally friendly biofuels increasing amounts of arable land have been given over to fuel rather than food.

This has contributed to the rapid rise in international wheat prices, which in turn is raising food prices.

Miss Sheeran said global food reserves were at their lowest level in 30 years, with enough to cover the need for emergency deliveries for 53 days, compared with 169 days in 2007."

[Some media reports: Wheat price doubled in the last six months, tripled in the last 5 years. Rice price doubled in the last one year. In India, 300 million people go hungry to bed.(BBC: 11.03.2008)]

III. Limits to Growth / Raw Materials Scarcity

For a long time after the publication of *Limits to Growth* by Meadows et al., not only establishment economists but also self-proclaimed environmental economists denied any such limits. Of late, however, they are showing signs of doubt in their earlier conviction. Below we reproduce some excerpts from an editorial article published in a major national daily newspaper of Germany (Oldag 2008).

"While the big share markets ... are suffering from the afterpains of the credit crisis, the prices at the raw materials markets apparently know only one direction: upwards." ... "Many things indicate that the super-boom in raw materials prices is only at its beginning. Demand and supply are diverging widely, which could slow down economic growth all over the world. A dangerous cocktail of three negative economic facts is coming up - unstable financial markets, the weakening US-Dollar, and the rapidly rising raw materials prices, which indicates panic at the market."

"While it has become a fashion among economists to go into raptures over the beautiful world of the internet and service society, an industry is experiencing a surprising renaissance: It is the coal- and steel industry of the previous century."

“The crude oil price has just broken the old record of 103 US-Dollars per barrel [as of 12.03.2008, US\$ 110]. The price of copper, that is used in computers, TV-sets and cell phones, has almost doubled within two years. Iron ore is more than two and a half times as costly as in 2004. Rolled steel, which is needed by car makers, costs 550 US-Dollars per tonne, which is almost three times as much as five years ago.” [In 2006, the price of uranium was more than six times as high as five years ago (International Herald Tribune, 5.9.2006)]

“Speculative influences alone cannot explain this strong rise in prices. It is above all the raw materials hunger of emerging economic giants China and India, which is driving the prices upwards. ... In a few years ... China would replace the USA as the biggest consumer of oil.”

“At the same time, the reserves are fast becoming exhausted. Sometime in 30 to 50 years, the last drop of oil under the Arabian desert will have been squeezed out. In the North Sea the Oil companies are already dismantling extraction platforms. In the Gulf of Mexico engineers are trying to extract the black gold by means of extremely costly deep drilling. In the case of copper, lead, Nickel, zinc and tin the end is, of course, not yet near. However, already now, the mining companies must invest billions of Dollars in order to exploit the existing mines more efficiently.”

IV. Correlation Between Economic Growth and Environmental Degradation

A report in Financial Times (London) of 8 September 2006 says: According to estimates of the Chinese National Bureau of Statistics, the costs of ecological damage in China in the year 2004 amounted to the equivalent of 3% of the gross domestic product (GDP). According to the Bureau, it would cost the country 106 billion Euro to clean up the polluted environment. That amount is 7% of the GDP of 2004.

Let us remember that in 2004 the Chinese economy grew by about 10%. So how much was the net benefit?

V. Energy Balance

What we have called “energy balance” is also called in the relevant literature “net energy”, “energy profit ratio”, “energy yield ratio”, EROEI (energy return on energy invested). Howard T. Odum (1996), from whose

book we reproduce below some data, prefers to use the term “emergy” instead of “energy” in order to stress that the energy embodied in the equipment used must be calculated and included in the energy balance. Far more optimistic figures are also there in the literature, but they are older and/or not convincing. The data shows that, except hydroelectricity, the renewables are impractical ideas, are no match for the conventional sources of energy.

Item	Energy Yield Ratio
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No Emergy Yield

Farm windmill, 17 MPH wind	0.03
Solar water heater	0.18
Solar [photo]voltaic cell electricity	0.41

Fuels Yielding Net Emergy

Palm Oil	1.06
Energy-intensive corn	1.10
Sugarcane alcohol [ethanol]	1.14
Plantation wood	2.1
Lignite at mine	6.8
Natural gas, offshore	6.8
Oil [imported from] Middle East	8.4
Natural gas, onshore	10.3
Coal, Wyoming	10.5
Oil, Alaska	11.1
Rainforest wood, 100 years growth	12.0

Sources of Electric Power Yielding Net Emergy

Ocean-thermal power plant	1.5
Wind electro-power	2 - ?
Coal-fired power plant	2.5
Rainforest wood power plant	3.6
Nuclear electricity	4.5
Hydroelectricity	10.0
Geothermal	13.0
Tidal electricity, 25 ft. tidal range	15.0

[Odum’s data are here quoted from Heinberg (2003: 153)]

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SARAL SARKAR

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