

Expensive Oil: For Least Developed Countries a Quiproquo of Curse and Blessing in Disguise

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Background Paper for UNCTAD's Report on Least Developed Countries

Ignacy Sachs*

The early seventies of the past century were marked by an environmental revolution in people's minds. It was prompted by the realization of the finiteness of the Planet Earth and of the staggering environmental disruption caused by rapid economic growth on account of careless technologies, predatory use of natural resources and excessive reliance on fossil fuels.

More than thirty years later – and three world conferences on environment and sustainable development held in Stockholm, Rio de Janeiro and Johannesburg – the gap between environmental rhetoric and disruptive economic growth is widening. Yet, future historians of our ages may recognize 2005 as a turning point in public awareness insofar as it signals the beginning of the oil endgame.¹ Where more than three decades of environmental predication failed, the hike in oil prices succeeded. Gradual phasing out of oil consumption and its substitution by biofuels, side by side with the search for greater energy efficiency, have been put on the agenda of the development debate.

Total oil depletion is not for tomorrow, perhaps not even for this century. But there are good reasons to believe that a structural shift occurred towards high oil prices with dramatic consequences for the least developed countries, both the oil exporters and the oil importers.

The former will enjoy windfall profits, a curse in disguise judging by the performance of many oil exporting countries which have been unable to put to good use the rent accruing from oil and fell victims of Dutch disease, foreign exchange outflow and widespread corruption.

The latter will be confronted with deterioration of terms of trade and terrible balance of payments squeeze, likely to offset the promised increase in ODA. This predicament may yet become a blessing in disguise if the countries concerned revise thoroughly their development strategies and seize the opportunity given to tropical countries to produce biofuels, first to substitute the imported oil and, then, to export ethanol and biodiesel to industrialized countries.

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The present paper will start with a brief discussion of the oil endgame. It will then examine the impact of expensive oil on oil exporting LDCs before addressing the energy dimension of inclusive and sustainable development strategies in oil importing LDCs. A final section will contain some reflections on a possible action plan.

BEYOND THE OIL AGE

An intense debate divides the specialists with respect to the forthcoming oil-peak and the length of the depletion period which may extend beyond this century.² For our purpose it is not important to know when the ultimate reserves of oil will be exhausted. None of the past transitions from one energy to another (from wood to coal to oil) occurred because of physical shortages. We ought to be interested in phasing out oil consumption (and for that also the consumption of gas and coal) on account of the disrupting environmental impact of greenhouse gases released by fossil energy, not speaking of the dangers arising from the explosive geopolitics of oil. The endgame of oil should thus precede the physical end of oil. Ideally we should enter in the beyond oil age as soon as possible. But in a world in which economic criteria are decisive, this could not happen so long as cheap, versatile and easy to transport oil outpriced alternative sources of energy. The turning point which put biofuels on the agenda, was the recent price hike of oil. Sugar cane ethanol produced in Brazil becomes competitive with oil priced at 35 dollars per barrel.³

The question therefore is: to what extent we are in presence of a structural shift in prices?

Once more, opinions are divided and sharply polarized. Some pessimists (or should we say optimists?) consider that the price of a barrel may exceed hundred dollars.⁴ At the other extreme are those, who believe that the present prices will not last. But very few risk to say that they will decrease below the 40 dollars level, which already makes biofuels competitive, at the present level of technology. In future we may expect the costs of production going down on account of higher agricultural productivity, improvements in processing and scaling up of production. As trees and crops grown for biofuels give the right to carbon credits, their competitiveness is further enhanced.

Moreover, the evidence gathered by the first school of thought looks more impressive. After all a leading oil company, Chevron, puts ads in newspapers saying that in the last twenty years for every two barrels consumed, only one barrel was added to oil

reserves. This admission of depletion comes, so to say, from the horse mouth. We ought, therefore, work with the assumption that high oil prices have come to stay, opening a lasting opportunity for biofuels and other alternative energies.

In this paper we are mainly concerned with biofuels for the following reasons:

- liquid biofuels - ethanol and biodiesel – substitute the liquid petrol- based fuels essential to the transportation systems; their use does not require the modification of the existing infrastructures and allows to stay, for better and worse, within the motorcar civilization;

- tropical countries have favorable conditions for the production of biomass for biofuels in rain tropical as well in semi-arid regions;

- if properly handled through appropriate policies, production of biofuels may generate a fair number of opportunities for decent work and livelihood for smallholders and their families who constitute between 40 and 50 percent of working population in the developing countries.

Thus promotion of biofuels is at the intersection of the three most important challenges facing our century: provision of decent work to the poor masses, arresting the climate change and freeing humanity from the perils of geopolitics of oil.

FOR OIL EXPORTING LDCs A CURSE IN DISGUISE

In theory, windfall profits from oil exports should be a blessing for the oil exporting LDCs. Windfall gains for African oil exporters already in 2004 were more than 30 billion dollars. Of this, more than 14 billion accrued to governments in the form of higher royalties, taxes and direct export revenue for state-owned enterprises.⁵ Research by Overseas Development Institute found that for the eight oil exporting States in sub-Saharan Africa - Nigeria, Equatorial Guinea, Cameroon, Angola, Congo (Brazzaville) Gabon, Sudan and Chad - the combined financing surplus, over and above their own MDG investment needs and recurrent public expenditure could be as high as 22 billion in 2006 and 35 billion in 2015, around half the total MDG financing gap for the region.⁶ Warner is right to say that these funds could become, at least in part, a source of aid to the many countries of the region hurt by the elevated cost of oil imports and that resource-rich African countries should be incentivated to invest some of their windfall surpluses in productive infrastructure across borders in sub-Saharan Africa.

Alas, what we see in most oil producing countries are the symptoms of the Dutch disease. The oil industry creates very few jobs, out of proportion with its share in GNP and in government revenues. Oil exports induce an excessive appreciation of the local currency and domestic production becomes too expensive to compete with imported goods, not speaking of perverse effects of oil bonanza in form of corruption, nepotism, ethnical struggles and wars, as well as of extravagant and pharaonic constructions.⁷

Jean-Marie Chevalier sums up his description of the Dutch disease in the following words: “*it is thus possible to speak of a true oil curse, which affects many oil producing countries in Africa, Middle-East, the Republics of Central Asia, Latin America, Asia and perhaps even Russia*”.⁸ Quite significantly, the government of Azerbaijan in its advertisement seeking a senior international adviser for potential use of Azerbaijan’s oil revenues “*to convert black gold into human gold*” (sic) foresaw as an activity for him economic modeling of policy alternatives to minimize the risk of Dutch disease.⁹

An abundant literature has exposed the devastating effects of Dutch disease and corruption on such oil producing countries like Nigeria, Angola¹⁰ and Equatorial Guinea. The latter country has been growing between 1990 and 2003 at the impressive rate of 16,8 percent per year, almost twice as rapidly as China. It produces around three barrels per day for every five inhabitants which gives Guinea the fifth largest per capita production of oil in the world. Today Guinea has the 28th ranking in the world with respect to GNP per capita, but only the 121st ranking as far as the HDI is concerned. The life expectancy is of less than 44 years and infant mortality is of 97 per thousand in the first year of life. Equatorial Guinea invests in public health a mere 1,3 per cent of its budget.¹¹ Another depressing instance of the working of Dutch disease comes from unemployment plagued Algeria, where 20 thousand Chinese construction workers have been brought to build apartment houses.¹²

Thus, oil producing LDCs are an extreme case of enclave-type economies in which the investment-profit nexus is outwardly oriented and the challenges of diversification are not met.¹³ To revert this unfortunate trend two conditions must be met:

- as recalled in the UNCTAD report just quoted “*strong and capable States are needed to bargain with large firms*” (p. 58), particularly so with the oil majors;
- development cannot be designed piecemeal (or for that project-wise) ; it calls for a holistic approach and appropriate handling of all the forward and backward linkages of each project.¹⁴

Recently, the case of Chad has been presented as a successful departure from the past practices with the bulk of royalties supposed to feed a special development fund. According to the World Bank and the oil companies that participate in the deal, great attention has been given to equitable compensating of peasants, whose land was expropriated for the construction of the pipe-line. However, several articles and reports give a much more critical description of the prevailing situation. Even **National Geographic** published a first hand report accounting for the discontent of the local population and quoting the Catholic bishop of Doba, Michel Russo, as saying that “*people didn’t get anything except dust.*”¹⁵ The government of Chad complains that the companies apply an excessive discount on the price of oil on account of its poor quality and has called for an audit. The strongest denunciation of the Chad-Cameroon pipe-line came from Amnesty International. The companies operating in Chad are not required to respect all the national legislation relative to human rights.¹⁶

For good practice, we must look to the Norwegian experience with the Petroleum Fund now worth 190 billion dollars and rising fast.¹⁷ But conditions in this small and rich Scandinavian country with a strongly implanted Welfare State differ sharply from those prevailing in LDCs. Even though, with all that oil wealth, the welfare system could be improved. Recently, the Central Bank of Norway invited Henrik Syse, a philosopher, to think about the good uses of the Petroleum Fund.¹⁸

By contrast, in Canada the oil bonanza, which profits most to the province of Alberta, has provoked vivid political discussions, both within Alberta and nationwide. Should the windfall oil prices bring about the slashing of taxes, investment in physical and social infrastructures or else further expansion of the Trust Fund which has already accumulated more than 12 billion Canadian dollars? A populist politician proposed the distribution of a handout of 400 Canadian dollars to each Albertian. Other Canadian state raised the question of partly sharing the oil resources, but only one Albertian in five backed this proposal.¹⁹

Another recently unfolding experience, to be closely followed, is the policy applied by the president of Venezuela, Hugo Chaves, and the national oil company PDVSA. Venezuela is renegotiating the terms of contracts with foreign oil companies, so as to grant a 51 per cent participation to State-owned PDVSA and to increase the royalties from 16.6 to 30 per cent and the taxes from 34 to 50 per cent. At the same time, it is transferring its foreign exchange reserves from American to European banks. Besides contributing with 10

billion dollars to one third of Venezuela's federal budget, PDVSA has earmarked in 2005 over 4 billion dollars for social programs and development projects.

Part of the government oil revenues finances the new Ministry of Popular Economy which has an annual budget of 1 billion dollars. According to Minister Elias Milano, "*Our focus is local and territorial development by massive training of our workers in order to produce the basic necessities for popular consumption*".²⁰ The intention is clear: to transform royalties in a lever of inclusive and sustainable development, even though it is too early to evaluate the progress made in reducing the social debt of Venezuela: 57 per cent of population below the poverty line and a 17 per cent unemployment rate.

Moreover, Venezuela supplies Cuba with nearly 100 thousand barrels a day of subsidized oil and is offering discount prices to Caribbean countries. In exchange, Venezuela receives medical help from 17 thousand Cuban doctors and dentists stationed in Venezuela.²¹

In a recent review of the debate on the Dutch disease and ways of counteracting it, the Economist insisted on the importance of greater disclosure and transparency in oil dealings. The Extractive Industries Transparency Initiative promoted by Tony Blair points in the same direction.²²

FOR OIL IMPORTING LDCs A BLESSING IN DISGUISE?

Even for the industrialized oil importing countries the oil price shock is difficult to cope with and will affect negatively their rate of growth.²³ What to say for LDCs? For them it comes as a catastrophe, and one more proof that globalization in its present asymmetric form, far from creating favorable conditions for their development, acts as a powerful obstacle.

To deal with the new situation no immediate solutions are at sight, except hoping for some extra foreign aid from international sources or from regional oil exporters.

In the longer run, a thorough revision of the development strategies is called for in order to reduce the dependence on oil based fuels. This can be achieved in three complementary ways:

- the most difficult one and, at the same time, the most effective consists in a structural modification of the energy profile of the development path;

- sensible reduction of the oil-addiction can be achieved through measures of energy conservation²⁴ and through the use of more efficient domestic appliances such as improved stoves, solar stoves, solar energy water heaters, etc.;

- finally, oil-based fuels can be substituted by biofuels and, more generally, fossil fuels by renewable energies.

An important caveat is that there is no point in advocating renewable energies in general, and biofuels in particular, so long as the present widespread practice of deforestation by the consumers of fuelwood is not curbed. Given the importance of subsistence activities in LDCs,²⁵ it is imperative to propose environmentally sustainable solutions for the local production of energy for domestic consumption. Hence the importance of new technologies that produce “*green charcoal*” from agricultural waste.²⁶ Alternatively, farmers ought to plant rapidly growing species of trees for fuelwood.

We shall briefly examine below the three options.

The energy profile

The energy profile depends on the mix of activities, their location, the techniques employed and the efficiency in the production and final use of energy. The two most important variables are the volume and distance of transportation required for goods and people and the rate and pattern of urbanization.

One manner of reducing the demand for expensive oil-based fuels consists in strengthening the local economies, so as to make them less dependent on goods brought from far away. Yves Cochet, a former French environment minister, strongly recommends this strategy of promotion of local development.²⁷ It remains to be seen to what extent high costs of transportation will act as a brake to delocalizations and even set into motion a process of “*deglobalization*”.

As for the challenge of rapid and premature urbanization, so characteristic of many LDCs, it is time to recognize that it creates more problems than it solves. As pointed out by the British Commission for Africa, Africa is well on the way to European levels of urbanization, but without the economic base to sustain it. As a result, around 72 per cent of the total urban population of Africa live in slums and some cities are socially unsustainable. Curiously, the same report recommends that international community should empower African governments in planning for rapid urbanization.²⁸

The statistics of African urbanization may be inflated because of the use of the dichotomy “urban-rural”, while both the European Union and the United States

recommend nowadays a tripartite classification. Besides the numbers of urban dwellers, the demand for energy will depend on the physical outlay of the town, the lifestyles of its inhabitants and the transportation system. All over the world, a major push is needed to make cities more resource efficient and to reduce their sprawling ecological footprints.²⁹ For the LDCs the urgency is even greater, not speaking that they can still avoid some of the mistakes committed in the advanced countries and leapfrog into an energetically less intensive service society, redesigning cities for people (and their bikes) rather than for automobiles.

Greater energy efficiency

The amount of energy required to produce 1000 dollars of GNP is an indicator commonly used as a proxy for energy efficiency. It varies greatly from country to country and should be carefully studied. In reality, it subsumes two different measures : on the one hand, the efficiency of the energy production and distribution and, on the other hand, the efficiency of the energy final use. Considerable improvement may be achieved in both.

According to Amory Lovins, it should be possible to cut by more than half the energy consumption in the United States, projected for 2025 at 28 million barrels/day, by adopting a set of measures improving the efficiency of the end-use of energy at an average cost of 12 dollars per barrel foregone, i.e. a fifth of the current price of oil. Using energy more efficiently makes sense not only because it reduces the emissions of greenhouse gazes, but also because conserving fossil fuels is much cheaper than buying them.³⁰

Renewable energies.

The limits of this paper do not allow for a detailed discussion of the prospects of different renewable energies, and even less for the country-wise analysis of the most suitable energy mixes. In this paper we concentrate, for reasons already explained, on agroenergy.

AGORENERGY: AN OPPORTUNITY FOR LDCS IN TROPICAL REGIONS

In June 2005, the International Energy Agency organized together with the United Nations Foundation and the Brazilian government an international seminar “Assessing the Biofuels Option”, which marked so to say the coming of age of biofuels.³¹ It also gave to the Brazilian delegation an opportunity to present the thirty years experience of Brazil in

producing ethanol from sugar cane and the recently approved biodiesel program (see box 1).

Without prejudging what are the ultimate limits of world biofuels production, given the limited supply of agricultural land, it is submitted that several LDCs have suitable conditions to produce domestically ethanol as an additive and/or substitute for gasoline and in this way stimulate the development of productive forces in the countryside.

Ethanol derived from sugar cane has an excellent energy-in/energy-out ratio obtained in the processing of sugar cane.³² The more so that it is possible to produce simultaneously considerable quantities of electricity through the so-called cogeneration process.

Up to 25 per cent of ethanol can be added to gasoline without any modification of the engine. Furthermore, Brazil is currently producing bi-flex motorcar engines that allow for blending different proportions of ethanol and gasoline, depending on their availability and relative costs. Embraer is even testing ethanol as a fuel for small planes.

Sugar cane ethanol has a clear comparative advantage, both in costs of production and energy-in/energy-out ratio, over ethanol produced from grains. For the moment being, the cost of production of celulosic ethanol is quite high, but a breakthrough in this extremely interesting technology is envisageable within a few years. Let us recall that celulosic ethanol can be extracted from any kind of agricultural waste, stalks, straws etc., as well as from trees and crops specially grown for this purpose.

By contrast, there exists a wide array of oil-seeds that can be selected as the raw material for the production of biodiesel. Brazilian scientists work on more than ten different species, some adapted to rain tropical regions like palm trees, other suitable for the semi-arid regions like ricin (mamona). The list contemplated in India contains as many as eighty plants, although strong preference is given to *Jatropha* nut (see box 2).

When evaluating the rentability of biodiesel, the following elements must be taken into account:

- oil-cakes may be turned into a valuable livestock feed and/or fertilizer; large scale production of biodiesel ought to be associated with restructuring of cattle breeding and reducing the pasture area to be released for agriculture ; depending on the crop chosen, biorefineries will turn out different kinds of coproducts, some of them quite valuable, other more difficult to sell;

- crops and trees grown for biofuels, that substitute fossil fuels, entitle to claiming and selling of carbon credits, as foreseen by the Kyoto Protocol ; as a matter of fact, carbon

sinks should be always associated with socio-economic projects that contribute not only to sustainability, but also to inclusive development ;

- locally produced oil can be used to action stationary engines for water pumping, production of electricity, etc.³³

One may assume that market forces will impose biofuels as an alternative to expensive oil. But political will and public policies will be required to protect the interests of small farmers and ensure that biofuels are produced in environmentally sustainable ways. The challenge is to start a new cycle of rural development, generating a fair amount of employment and self employment for small farmers and their cooperatives, carried within the precepts of the “*evergreen revolution*”, as defined by M.S. Swaminathan : learning to produce more on less land and with less water, transforming agriculture into the mainstay of livelihood security system for hundreds of millions of farmers and of ecological security system for the planet.³⁴

How far and how fast we can move along those lines?

The reply to the first question will depend on detailed country by country assessment of the availability of land, water, suitable crops and/or tree species, with special reference to integrated food-energy production systems, which take as paradigm the natural ecosystems, close whenever possible the loops between different components of the system and make the best possible use of agricultural residues. It is submitted that considerable savings of land and water necessary to produce biofuels can be achieved in this way, making compatible the search for greater food security with substitution of oil-based fuels by agroenergy.

In Africa this work has been started by a series of policy dialogues organized by “Partners for Africa”, a project implemented in close cooperation with the European Energy Initiative for Poverty Eradication and Sustainable Development, launched at the Johannesburg Summit. The final policy dialogue was held in June 2005 in Dar es Salaam.³⁵ The project has already assembled valuable documentation. A country like Tanzania to take one example, which has 4,6 million hectares under crops (5,3 per cent of its land mass), could easily produce its own fuel and it even has export potential after having fully substituted its oil imports. Tanzania currently imports 20 thousand barrels per day. To substitute this by biofuels it would need 300 thousand hectares with a productivity of 4 thousand liters per hectare and year. It would save in this way 0,4 billion of dollars per year and generate 300 thousand jobs (on the optimistic assumption of 1 job per hectare).

A private consulting firm, F.O.Licht, convened in November 2005 in Amsterdam a large conference to review the recent technological advances in ethanol production. Asia Biofuels Conference and Expo was held in December 2005 in Manila with 40 countries represented. A Central Biofuels Conference and Expo is scheduled for March 2006 in Panama City, focusing on development of biofuels in Latin America.

It is to be expected that these events will generate a stream of information about actual performances and costs of production of different kinds of biofuels.

Further work along those lines will emerge from the UNCTAD Biofuels Initiative supported by the UN Foundation, which was formally launched on December 7th in Montreal by UNCTAD's Secretary General. In his video message Dr. Supachai Panitchpakdi stressed that as petrol prices continue to rise, biofuel production reduces oil import dependency and increases energy security. It creates employment, encourages economic diversification, promotes rural development and contributes to the Kyoto Protocol reduction targets using the financial incentive provided by the Clean Development Mechanisms.

As for the second question, the pace at which the LDCs will be able to start and expand local production of biofuels will depend on political will, ability to design appropriate public policies, access to technologies and, last but not least, access to finances. South-South technical cooperation, with Brazil, India and South Africa as main suppliers of know-how and equipment to LDCs, would be welcome. Furthermore, as already mentioned, the developing oil exporting countries could contribute to the financing of biorefineries to be set in LDCs.

The primary energy potential for biomass has been undervalued by several authors of recent books on the consequences of oil depletion. The reasons to it are manifold:

- a hasty extrapolation of the US performance in corn-based ethanol, characterized by a very low energy efficiency;
- a propensity to look for futuristic technological solutions, underestimating the potential of agriculture, forestry and turning biomass waste into wealth;³⁶
- vested interest of powerful lobbies such as the nuclear energy lobby;
- last but not least, an underestimation of the land and water resources available for the production of bioenergy without conflicting with the paramount objectives of food security and environmental prudence. Hence the importance of refining of the estimates of

land and water needed to produce biofuels through integrated food energy systems adapted to different biomes.³⁷

HOW DO WE MOVE THERE?

To conclude this paper some reflections are presented in view of an action plan.

1. Dutch disease should be easier to cope with than AIDS, but it requires as a political precondition a performing and active, lean and clean Developmental State capable of a holistic approach to planning, so as to use the transient oil rent to finance a socially inclusive and environmentally sustainable long term strategy, ensuring decent livelihoods to the entire population and using as much as possible the renewable resources. The existence of State-owned oil enterprises may be an asset when negotiating with the powerful oil companies.

The oil producing sector usually acts as an enclave isolated from the rest of the economy. Outmost effort should be made to build backward and forward linkages and create synergies between the oil sector and the domestic economy. Furthermore, an exchange policy is called for to offset the trend towards the appreciation of the local currency.

Even in oil exporting countries it makes sense to expand the production of biofuels, so long as their cost will be competitive when compared with oil prices. The surplus of oil can always be sold on world markets.

Outmost care should be given to the production of sustainable energy for the household sector. It makes no sense to advocate the substitution of oil by biofuels while tolerating at the same time the devastation of forests by the collectors of fuelwood.

As already mentioned, besides financing a national development strategy, the oil rent could be partly used as a leverage to promote regional development by feeding a Regional Development Fund and/or by supplying oil at discount prices.

2. The challenge facing the oil importing LDCs is much more difficult, insofar as oil substitution by biofuels cannot happen overnight. It will require substantive investment in knowledge, skills, equipment and, therefore, financial resources. Furthermore it should not interfere with the paramount objective of food security. The same political precondition – a performing Developmental State – applies *a fortiori* here.

It should be clear that production of biofuels is only part of a broader energy strategy, in which the most important component is the search for energy conservation and

efficiency - the most efficient energy is the one which is foregone. This may require a drastic overhaul of the urban design and lifestyles, more specially of the transportation systems with more emphasis on mass transportation and bikes, and less on individual cars. Local economies ought to be strengthened, so as to reduce the dependence on commodities brought from far away and increase the share of locally produced goods (which is not tantamount to recommend autarky). In a sense, expensive oil is likely to bring about some “deglobalization”.

A tempting idea is leapfrogging of LDCs into a modern service society, bypassing some stages of development of the today developed countries, characterized by consumerism and oil addiction.

In the same way, biofuels are only part of a broader strategy of valorization of biomass, which includes production of food, feed, green fertilizers, industrial feedstocks, pharmaceuticals and cosmetics. In turn, production and processing of biomass is only part of a broader rural development strategy, in which non-agricultural employment and pluriactivity of peasants and their families play an increasingly important role.

The scope for the production of biofuels should be therefore examined within the framework of a systemic rural development strategy. Production of biofuels offers an opportunity to increase rural employment and to provide sustainable livelihoods to small holders. It may yet prove the blessing in disguise of the oil shock. But carefully designed policies are called for to avoid that biofuels production in large and highly mechanized plantations gives rise to just another kind of enclave-economies. From the very onset, promotion of agroenergy should be associated with policies of land reforms, wherever appropriate, and of support to small scale farmers.

As already mentioned, production of biofuels should go hand in hand with the development of local sources of domestic energy, in order to curb the presently widespread practices of deforestation through predatory collecting of fuelwood. So long as this condition is not met, doubts may arise about attributing carbon credits to countries which engage in substitution of oil-based fuels by agroenergy.

3. So long as the substitution of oil-based fuels on the internal market is not completed, it is too early to speak of their potentially important exports to industrialized countries.

However, LDCs situated in the tropical regions will enjoy on account of climate permanent comparative advantage in growing sugar cane and oil seeds. They can therefore expect to be competitive. Their situation would be greatly improved if they could count

on long term contracts for the purchase of biofuels with export quotas and some mechanism to renegotiate periodically the prices.

It is submitted that UNCTAD could explore the possibility of organizing the future international markets of biofuels, so as to meet the interests of both, biofuels exporters and importers. Insofar as oil companies are involved in the retail trade of gasoline and diesel, they might be attracted by the prospect of a stable supply of agrobased additives to oil-based fuels and, therefore, accept the concept of an organized biofuel international market.

Special attention should be given to South-South cooperation, not only in trade in biofuels, but also in the realm of technical cooperation, training and sale of equipment. It is submitted that Brazil, India and South Africa (the so called G3) could take the lead in the organization of a South-South network on biofuels, and more generally agroenergy. UNCTAD's biofuel initiative has a major role to play in assisting the LDCs in these tasks.

BOX 1: BRAZIL'S NATIONAL PLAN OF AGROENERGY (2006-2011)

Released in October 2005 by the Minister of Agriculture, the Plan emphasizes the comparative advantages of the country to become a world leader in the production of biofuels without conflicting with food production and preservation of native forests: abundant resources in land and water, rich biodiversity, suitable climatic conditions, advanced research in tropical agronomy and biology, a capital goods industry capable of supplying equipment for refineries, last but not least, a 30 years experience in the pioneering program of Proalcool-use of sugar cane ethanol as an additive to and a substitute for gasoline.

The Plan aims at transforming agroenergy in the crown jewel of the Brazilian agrobusiness.

Renewable energies already account for 31.5 per cent of total energy in Brazil, as compared with 11.2 per cent in the world. The relative share of modern biomass is 23 per cent against 1.7 per cent in the world. The present production of ethanol-14 billion liters-is likely to increase to 26 billion liters in 2015 to meet the internal demand boosted by the success of flexicars (about 1 million at present, over 8 millions estimated for 2015). This will call for a 30 per cent expansion of the cultivated area of sugar cane, at present 5.5 million hectares of which roughly half goes for sugar production.

The latter figures should be put in the context of a reserve of yet uncultivated land suitable for agriculture estimated in 90 million hectares and the possibility of converting at least 30 to 40 million hectares of degraded pastures.

The volume of exports has not been estimated, but Brazilians expect that ethanol will become a valuable commodity. The break-even price of oil for the Brazilian ethanol is estimated in the Plan at 35 dollars per barrel, at 25 dollars by other sources. Brazilian ethanol has the lowest cost of production in the world. Moreover its energy out/energy in ratio is excellent: 8.3 as compared to 1.4 for ethanol extracted from corn. The prospect for large scale exports is thus bright, at least before cellulosic ethanol becomes competitive.

By contrast with the sugar cane ethanol, the biodiesel is still incipient, aiming at an initial B2 (2 percent additive of biomass oil, about 1 billion liters in 2007).

In the long run the target is B40 for 2035 plus significant export of biodiesel, side by side with ethanol.

Several crops are being tested, among them the oil palm for the rain tropical regions and the ricin (mamona) for the semi-arid Nordeste.

Production of biodiesel has received fiscal incentives differentiated by region and by size of the farm. Small scale farmers in the North (Amazon region) and in Nordeste are the most favored.

Sources: Ministerio da Agricultura, Pecuaria e Abastecimento, 2005, Plano Nacional de Agroenergia, 2006-2011, Brasilia; Macedo, Isaias de Carvalho (org), 2005, A Energia de Cana-de-açúcar, UNICA, Sao Paulo; Crestana, Silvio, 2005, Nasce a Nova Agricultura dos Tropicós (cyclostyled); O Estado de Sao Paulo, “Proalcool 30 anos, a arrancada do combustivel do futuro”, November 8th, 2005.

BOX 2: JATROPHA: A MIRACLE PLANT?

In India and in several African countries, great hopes are deposited in an exotic plant native from western hemisphere, Jatropha.

According to Indian sources, Jatropha can yield up to 2 tons of biodiesel fuel per year per hectare. Jatropha requires minimal inputs, stabilizes or even reverses desertification, and has use for a variety of products after the biofuel is extracted. India has many millions of hectares of wasteland – saline lands, degraded forests, and other land

unavailable for agricultural use due to overfarming. Biofuel screw presses are simple to make and can be produced and maintained by a village blacksmith.

If 10 million hectares of wastelands were used for biodiesel production with a modest estimate of 1,5 tons of seeds per hectare, 4 million tons of biodiesel would be produced – one tenth of India's annual oil requirement. Indian authors consider that employment would grow at the rate of one job per hectare (this seems over optimistic). At the same time 11 million tons of organic seedcake fertilizer or livestock feed and 0,4 million tons of technical grade glycerol would be produced for use or sale (B and G BHAGAT, "Hope in Jatropha – India gives biofuels a chance to grow", www.ecoworld.com).

In his speech on the occasion of the National Day on January 26th, 2005, the President of India, Abdul Kalam, made a passionate plea for converting waste land into perennial plantations of biofuels: « We have nearly 63 million hectares of wasteland available in the country, out of which 33 million hectares have been allotted for tree plantation. Certain multi-purpose bio-fuel plants can grow well in wastelands with very minimum input. Once cultivated, the crop has fifty years of life. Fruiting can take place in two years. Bio-fuel plants grown in parts of wastelands, for example, 11 million hectares can yield a revenue of approximately Rs. 20,000 crore a year and provide employment to over 12 million people both for plantation and running of extraction plants. It will reduce foreign exchange outflow for import of crude oil, cost of which is continuously rising in the international market... We should absorb the best of technologies available worldwide and start commercial operations immediately. One time investment needed for bio-fuel plantation to production in 11 million hectares will be approximately Rs. 27,000 crore. Capital equipment and investment in plant and machinery can come from bank loans and private sector entrepreneurs».

More recently the Indian Planning Commission published a report on biofuel recommending the creation of a biodiesel mission and proposing a pilot project: planting Jatropha on 400 thousand hectares of wastelands in 26 States.

Substitution of 20 percent of diesel was set as the long-term goal involving more than 13 million hectares of wasteland, forest land, agroforestry, fallow land, public land and even agricultural land (the latter for hedge plantation).

The Commission did not consider the production of sugar-cane ethanol on account of its implication for sugar production, nor did it elaborate on the prospect of "cellulosic ethanol".

*According to some observers, the statistics used on seed yields and input needs are fraught with uncertainty. It has been pointed out that seed yields in different (and up-to-now limited) field experiences vary from 1 to 12 tons per hectare. The ecological impact of large scale planting of *Jatropha* are not yet known in India, and for that in other countries. Hence the need to approach with circumspection the *Jatropha*-based biodiesel projects.*

*Priority ought to be given to a large scale research programme on plantation models, processes of oil extraction, equipment for large scale and local production of biofuels, environmental inputs of *Jatropha* and modalities of using the Clean Development Mechanism to claim carbon credits and reduce in this way the costs of production of biofuels. (see R.Kher, "Biofuels: the way ahead", Economic and Political Weekly, December 17th, 2005.)*

NOTES:

¹ This is the title of a recent book by Amory Lovins *et alli.*, partly funded by the Pentagon, **Winning the Oil Endgame – Innovation for Profits, Jobs and Security**, Rocky Mountain Institute, Earthscan, London, 2005. With forewords by G.P. Shultz and Sir Mark Moody-Stuart.

² For a comprehensive review of the debate about the imminent oil peak see : WINGERT J.L., 2005, **La vie parès le pétrole – de la pénurie aux énergies nouvelles**, Autrement, Paris, and "Oil in Troubled Waters – a Survey of Oil", **The Economist**, April 30th, 2005. See also KUNSTLER; J.H., 2005, **The Long Emergency – Surviving the Converging Catastrophes of the Twenty-First Century**, Atlantic Books, London and COCHET, Y., 2005, **Pétrole apocalypse**, Fayard, Paris; Goodstein, D., 2005, **Panne Sèche: la fin de l'ère du pétrole**, Buchet, Chastel, Paris.

In a recent interview in **Veja**, October, 5, 2005, Ano 38, n° 40, pp. 11-15, C.J. Campbell, chairman of the Association for the Study of Peak Oil & Gas, estimated total reserves of oil in 780 billion barrels, while oil companies claim that their reserves add up to 1150 billion barrels. The overestimation of reserves is linked to the way in which production quotas are set by OPEC.

For the opposite view see : ODELL R., 2005, **Why Carbon Fuels Will Dominate the 21st Century's Global Energy Economy**, Multi-Science Publishing.

³ It should be noted, however, that the cost of ethanol in European Union is fifty per cent higher than in Brazil, corn based ethanol produced in the U.S. has a cost in between the two.

⁴ See for instance GREENWAY, H.D.S., "Riding on empty", **International Herald Tribune**, September 10-11, 2005.

⁵ Data communicated by UNCTAD.

⁶ WARNER, M., "Sustained Oil, Gas and Mineral windfalls mean that Africa could fund a substantial portion of its own MDG Financing Gap", ODI, **Opinions**, n°. 51, september, 2005

⁷ Dubai is a good illustration of this frenzy. The Burj Dubai will be the highest skyscraper in the world when completed in 2008, with more than 700 meters and 190 floors. Another project consists in building three artificial islands in form of palm trees at the price of 1 billion dollars per unit. The islands will be occupied by aquatic parks, 60 hotels, 4000 mansions, 5000 flats and 1000 beach houses. Hidropolis will be the first submarine hotel in the world (cost 500 billion dollars). Dubailand, a kind of Disneyland of Arabias, will cost 5 billion dollars and will include the largest artificial ski ground, built in the desert (Claudia Pinho, "Loucuras de Dubai", **Isto E'**, 20 de abril de 2005.

⁸ CHEVALIER, J.M., 2004, **Les Grandes batailles de l'énergie**, Gallimard, Paris, p. 354.

⁹ **The Economist**, August 13th, 2005.

¹⁰ **The Economist**, dated September 17th 2005, p. 43, has the following to say on Angola: “*The irony is that Angola, where 70% of the people live in abject poverty, is rich. With over 1m barrels extracted every day, it has become the second-largest oil producer in sub-Saharan Africa, and volumes are expected to double by 2008. Oil, which provides close to 50% of the country’s GDP and over two-thirds of the government budget, has turned Angola into one of the top destinations for foreign investment in the region. It is also the world’s fourth-largest producer of diamonds. The economy grew by almost 12% last year, and could do even better this year. But too little wealth trickles down to ordinary Angolans. Much of the oil production has already been mortgaged. Angola’s foreign debt now stands at about \$9.5 billion-half of GDP. With only limited access to cheap borrowing, the Angolan government has turned to commercial, oil-backed debt. In 2003-04 alone, it raised \$4 billion from commercial banks and bilateral credit lines against future oil revenues. Vast amounts of money have also been nabbed by a small elite, and Angola is considered one of the region’s most corrupt countries.*”

¹¹ All these data are taken from the UNDP **Human Development Report 2005**.

¹² The present rate of unemployment in Algeria is still 17%, half of what it was in 1999 (**l’Expansion**, Janvier 2006).

¹³ For an excellent analysis of these economies see UNCTAD, **Economic Development in Africa – Rethinking the Role of Foreign Direct Investment**, New York and Geneva, 2005.

¹⁴ On this subject see Kalecki, M. and Sachs, I., 1966, “Forms of Foreign Aid : An Economic Analysis”, reproduced in **Collected Works of Michal Kalecki**, volume V, **Developing Economies**, Clarendon Press, Oxford, 1993, pp. 61-91.

¹⁵ **National Geographic**, “Pétrole africain, qui sont les gagnants ?”, septembre 2005, p. 58. See also POIRSON, A.C., “Ou est passé l’argent du pétrole tchadien ?”, **Le Monde Diplomatique**, septembre 2005.

¹⁶ Amnesty International, **Contracting out of Human Rights : The Chad-Cameroon pipeline project**, September, 2005. See also BERNARD. Ph., “L’oléoduc Tchad-Cameroun menace les droits de l’homme”, **Le Monde**, 10 septembre 2005.

¹⁷ **The Economist**, September, 17th, 2005.

¹⁸ **Le Monde**, 30 septembre, 2005.

¹⁹ See **The Economist**, a Survey of Canada, December 3rd, 2005

²⁰ See Marcia Pinheiro, O dissenso de Caracas, **Cartacapital**, November 2nd, 2005

²¹ Data taken from SCHWARTZ, N.D., “Oil’s New Mr. Big”, **Fortune**, October, 3, 2005. See also VIGAUX, B., “Le pétrole au coeur de la diplomatie”, **Le Monde diplomatique**, juin 2005.

²² The curse of oil, the paradox of plenty, **the Economist**, December 24th, 2005.

²³ According to an IMF’s model, an increase of \$10 a barrel in oil prices should knock three-fifths of a percentage point off the world’s output in the following year (**The Economist**; August, 27th, 2005).

²⁴ And water conservation, insofar as it reduces the energy demand for fetching, pumping and transporting water.

²⁵ See on this SACHS, I., “From Poverty Trap to Inclusive Development in LDCs”, **Economic and Political Weekly**, volume XXXIX, n° 18, May, 1, 2004.

²⁶ Pro-Natura International, a NGO affiliated to IUCN, has recently developed a continuous process of pyrolysis of vegetal wastes (agricultural residues, renewable wild-grown biomass) transforming them into green carbon. As a cooking fuel, green-charcoal is a considerable improvement in combating indoor air pollution. The use of the Green-Charcoal machine is a significant improvement towards reducing the greenhouse gas intensity due to the fact that the process burns the methane produced as its driving source of energy. The green-charcoal machines are now produced in South-Africa and exported from there.

²⁷ See COCHET, Y., 2005, **Pétrole apocalypse**, op. cit.

²⁸ Commission for Africa 2005, **Our Common Interest – an Argument**, Penguin Books, London, pp. 82-83.

²⁹ See on this GIRARDET, H., 2004, **CitiesPeoplePlanet**, Wiley-Academy, Chichester, West Sussex, and also DESSUS, B. and GASSIN, H., 2004, **So Watt ? – L'énergie : une affaire de citoyens**, Edition de l'aube.

³⁰ Lovins, Amory, **More profit with less carbon**, Scientific American Brazil, October 2005.

³¹ For the proceedings of this seminar see the IEA website (www.iea.org). For a state of the art on biofuels consult International Energy Agency, 2005, **Biofuels for Transport – an International Perspective**, OECD/IEA, Paris. See also **The International Partnership on Bioenergy – White Paper**, prepared by the Italian Ministry for the Environment and Territory, Rome, August, 2005.

For an up to date summary of Brazilian experiences and programs, see **Cadernos NAE**, n° 2, 2005, Brasilia (Nucleo de Assuntos Estratégicos da Presidência da Republica) and TOLMASQUIM, M. T. (org.), 2004, **Alternativas Energéticas Sustentáveis no Brasil**, Rio de Janeiro, Relume Dumara and also TOLMASQUIM, M. T. (org.), 2003, **Fontes Renováveis de Energia no Brasil**, Rio de Janeiro, Editora Interciência.

³² This is so because sugar cane waste is used as a source of energy in the production of ethanol. Evaluation of the advantages of biofuels depends crucially on this energy-in/energy-out ratio often miscalculated on the basis of an energy accounting that does not take into consideration the nature of the energy used as input.

³³ In the eighties of the past century, an attempt was made to recycle for this purpose old motorcar engines. For reasons that I ignore, this project was discontinued. It should be revisited.

³⁴ SWAMINATHAN, M.S., “For an Evergreen Revolution”, interview to **Frontline**, January 7, 2000.

³⁵ For the proceedings see www.partners4africa.org

³⁶ A popular Maoist slogan recommended turning waste into wealth.

³⁷ For the concept of integrated food energy systems see Sachs I. And Silk D., 1990, **Food and Energy Strategies for Sustainable Development**, United Nations University Press, Tokyo

For an optimistic evaluation of the biomass energy potential see Moreira J.R. (Cenbio, San Paulo), “Global Biomass Energy Potential”, paper prepared for the Expert Workshop on Greenhouse Gas Emissions and Abrupt Climate Change, Paris, September 30th, 2004 and Smeets, E., Faaiji, A., Levandowski, I., “A quickscan of global bio-energy potentials to 2050”, Copernicus Institute, Utrecht University, March, 2004.