SAHABAT ALAM MALAYSIA – FRIENDS OF THE EARTH MALAYSIA
POSITION PAPER ON MALAYSIA'S NATIONAL BIOFUEL POLICY
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"BIOFUELS SHOULD NOT BE CONSIDERED AS A RENEWABLE OR A SUSTAINABLE SOURCE OF ENERGY"

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I INTRODUCTION

Sahabat Alam Malaysia welcomes the intention of the Malaysian Government to address the host of issues stemming from our present mode of energy production and consumption. Our dependence on non-renewable fossil fuels which are fast depleting has indeed caused us numerous environmental problems such as the emissions of greenhouse gases and water pollution to name only a few, as well as economic uncertainties due to the escalating prices of petroleum and gas.

The addition of renewable sources as the fifth source of energy to the previous Four-Fuels Diversification Policy, simultaneously transforming it to the present Five-Fuels Diversification Policy, in 1999, is indeed a prudent response in managing Malaysia's energy policy.

Because the world is such at an important crossroads today, with regards to its energy production and consumption, it is however imperative that we assess our way forward correctly. The promotion of sustainable and renewable sources of energy is inevitable, given the future realities of fossil fuel reserves, and the environmental impacts of the continuous use of such energies. To this end, we must develop the appropriate criteria and standards in assessing the claim of sustainability and renewability for different energy sources as promoted by their respective advocates to prevent us from descending into the same environmental, economic and social crisis caused by our present methods of energy use. Thus, this paper would like to respond to the recent promotion of biofuels as a sustainable and renewable source of energy as outlined by the National Biofuel Policy (NBP).

In our view, liquid biofuels cannot be considered as sustainable or renewable for reasons which we will further argue below, in particular if they are produced from dedicated agricultural plantations for an export-oriented market.

This paper will thus elaborate our position firstly by evaluating the economic, environmental and social efficiencies of large scale liquid biofuel production, in particular if it is aimed for export, in order to demonstrate that biofuels are in fact not a better solution to our present energy crisis; and secondly by looking at other alternative sources to our current use of fossil fuels.

We will be focussing on the two types of biofuels most widely promoted today i.e. ethanol and methyl esters or commonly referred to as biodiesel.

II MALAYSIAN BIOFUELS FOR EXPORT: FEEDING THE NON-SUSTAINABLE LEVEL OF ENERGY CONSUMPTION IN DEVELOPED COUNTRIES

One of our main concerns on the promotion of palm oil biodiesel as a gradual replacement to fossil fuels is the intention of dedicating a segment of its production for export. We believe that the energy crisis the world is facing today is caused by both our dependence on the wrong kind of fuels and our extreme consumption levels. The world's present energy consumption pattern is unsustainable both in source and intensity. This issue is especially pressing in the developed countries in the North such as the United States, Western Europe and Japan.

With less than 4 percent of the world population, the Unites States for example, is releasing 22 percent of the global carbon dioxide emissions from its consumption of fossil fuels. On average, an American uses 8,000 litres of oil equivalents annually. Developing countries meanwhile only use the energy equivalent of 500 litres of oil per capita per year. Therefore, the only way to make the use of renewable energy sources meaningful at a global scale is for developed nations to first reduce their consumption level.

To this effect, for Malaysia to devote a significant part of our crop land to satisfy the non-sustainable lifestyle of developed countries is certainly an unwise step. We only need to look at the manner in which the petroleum industry has been monopolised by interests originating in the North to understand the grave implications of this to countries in the South like Malaysia. Equally important, this will directly put much of our land which can be used for other agricultural production and environmental conservation purposes, in competition with the demands of consumers in affluent countries.

III LIQUID BIOFUEL IS NOT AN EFFICIENCT SOURCE OF ENERGY

Before deciding that biofuels is a sustainable substitute for fossil fuels, we must first establish that biofuels will in fact be more environmentally, socially and economically efficient than other available renewable sources of energy. As such, there are two factors that we need to look into in evaluating the efficiency of ethanol and biodiesel.

First, we need to consider whether it takes more energy to grow the crop intended to produce ethanol or biodiesel than we can get out of ethanol or biodiesel when we burn it, as well as energy which will be used in its production, transport and delivery. This is a question of “energy balance” or the ratio of *energy output : energy input*. This can be done by looking at the "net energy value" (NEV).[1]

Secondly, we must also re-evaluate our definitions of sustainability and renewability. This entails the need to analyse whether the production of such energy crops presents a significantly lower direct and indirect environmental and social costs than fossil fuel production.

a. Energy efficiency, economic costs and land use concerns

The question of efficiency of biofuels is indeed contentious. Despite ample research by prominent scientists, most notably by David Pimentel, Professor at the College of Agriculture and Life Sciences, Cornell University and Tad W. Patzek, Professor of Civil and Environmental Engineering at the University of California-Berkeley, indicating that biofuels are not at all sustainable, there also exists other research work claiming significant benefits from the use of biofuels, from both the industry as well as non-industry sectors.

However, we caution that efficiency must be studied from a comprehensive perspective. We need to look at at least two levels of efficiency in the production of the biofuel concerned, namely energy and land resource utilisation, and the associated ecological and social costs incurred in its production, distribution and consumption.

[1]The ratio most often quoted by the ethanol industry is 1.25. This ratio implies that since a gallon of ethanol delivers 77,000 BTU, the input energy needed to produce that gallon would be no more than 61,600 BTU. However this figure is indeed controversial.

(i) *Linking efficiencies with other costs and concerns*

The efficiency of ethanol has been more widely studied than biodiesel since it is the largest volume of biofuel in production in the world today, partly due to its widespread use in the United States and Brazil whereby ethanol is derived from corn and sugarcane respectively.

As early as August 2001, a study led by David Pimentel of Cornell University yielded the following results:[2]

- An acre of U.S. corn yields about 7,110 pounds of corn for processing into 328 gallons of ethanol. But planting, growing and harvesting that much corn requires about 140 gallons of fossil fuels and costs US$347 per acre. Thus, even before corn is converted to ethanol, the feedstock costs US$1.05 per gallon of ethanol.

- The energy economics get worse at the processing plants, where the grain is crushed and fermented. As many as three distillation steps are needed to separate the 8 percent ethanol from the 92 percent water. Additional treatment and energy are required to produce the 99.8 percent pure ethanol for mixing with gasoline.

- Adding up the energy costs of corn production and its conversion to ethanol, 131,000 BTU are needed to make one gallon of ethanol. One gallon of ethanol has an energy value of only 77,000 BTU. This means that about 70 percent more energy is required to produce ethanol than the energy that actually is in ethanol. Every time you make one gallon of ethanol, there is a net energy loss of 54,000 BTU.

- Ethanol from corn costs about US$1.74 per gallon to produce, compared with about US$0.95 to produce a gallon of gasoline. This is one of the chief reasons why fossil fuels, and not ethanol, are used to produce ethanol. The growers and processors can't afford to burn ethanol to make ethanol.

- Most economic analyses of corn-to-ethanol production overlook the costs of environmental damages, which should add another US$0.23 per gallon. Corn production in the U.S. erodes soil about 12 times faster than the soil can be reformed, and irrigating corn mines groundwater 25 percent faster than the natural recharge rate of ground water.

- The average U.S. automobile, travelling 10,000 miles a year on pure ethanol (not a gasoline-ethanol mix) would need about 852 gallons of the corn-based fuel. This would take 11 acres to grow, based on net ethanol production. This is the same amount of cropland required to feed seven Americans.

- If all the automobiles in the U.S were fuelled with 100 percent ethanol, a total of about 97 percent of U.S. land area would be needed to grow the corn feedstock. Corn would then cover nearly the total land area of the U.S.

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[2] *Ethanol fuel from corn faulted as 'unsustainable subsidized food burning' in analysis by Cornell scientist*. August 2001. http://www.news.cornell.edu/releases/Aug01/corn-basedethanol.hrs.html

In March 2005, Professor Ted Patzek from the University of Berkeley-California also announced his findings on ethanol efficiency, which was published in the journal *Critical Reviews in Plant Science*. In this study, he factored in the myriad energy inputs required by industrial agriculture, from the amount of fuel used to produce fertilisers and corn seeds to the transport and wastewater disposal costs. The following were his conclusions from the study:[3]

- The cumulative energy consumed in corn farming and ethanol production is six times greater than what the end product provides the car engine in terms of power.

- Using United Nations data, he examined the production cycles of plantations hundreds of billions of tons of raw material. This is to ascertain the sustainability of industrial farming in developing nations where sugarcane and trees are grown as feedstock for ethanol and other biofuels. He admitted that while one farm for the local village will probably make sense, developing a 100,000 acre plantation exporting biomass on contract to Europe will have disastrous impacts. Since one square meter of land can roughly produce one watt of energy, to cater for export, in countries such as Brazil alone, a jungle the size of Greece will be destroyed.

In June 2005, another study on the carbon dioxide emissions, cropland area requirements, and other environmental consequences of growing corn and sugarcane to produce fuel ethanol also indicated that direct and indirect environmental impacts of growing, harvesting, and converting biomass to ethanol far exceed any value in developing this energy resource on a large scale. The researchers, Marcelo E. Dias de Oliveira, Burton E. Vaughan, and Edward J. Rykiel, Jr., who were also from Cornell University, published their findings in the July 2005 issue of *BioScience*, the journal of the American Institute of Biological Sciences (AIBS), which discovered the following:[4]

- In the U.S., ethanol yielded only about 10 percent more energy than was required to produce it.
- In Brazil, where ethanol is sourced out from sugarcane, the process yielded 3.7 times more energy than was used to produce it.

At the same time, the study also looked into some consequences of moving to greater fuel ethanol use. The results were unfavourable to in both countries. In Brazil, reducing the rate of deforestation seemed likely to be more effective for taking carbon dioxide out of the atmosphere. In the U.S., reliance on ethanol to fuel the automobile fleet would require enormous, unachievable areas of corn agriculture, and the environmental impacts would outweigh its benefits, due to its heavy dependence on private vehicle use.

Last but not least, in July 2005, Pimentel and Patzek both announced the results of their collaboration on the detailed analysis of the energy input-output ratio of ethanol production from corn, switch grass and wood biomass as well as for biodiesel production from soybean and sunflower plants. This time around their research yielded the following findings, which were published in *Natural Resources Research* (Vol. 14:1):[5]

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[3] *Ethanol stirs eco-debate*. March 2005. http://www.coe.berkeley.edu/labnotes/0305/patzek.html

[4] *Press Release: Fuel ethanol cannot alleviate US dependence on petroleum*. June 2005. http://www.aibs.org/bioscience-press-releases/050624_fuel_ethanol_cannot_alleviate_us_dependence_on_petroleum.html

[5] *Cornell ecologist's study finds that producing ethanol and biodiesel from corn and other crops is not worth the energy*. July 2005. http://www.news.cornell.edu/stories/July05/ethanol.toocostly.ssl.html

- For ethanol, it was found that:
  - Corn requires 29 percent more fossil energy than the fuel produced.
  - Switch grass requires 45 percent more fossil energy than the fuel produced.
  - Wood biomass requires 57 percent more fossil energy than the fuel produced.

- For biodiesel, it was found that:
  - Soybean plants require 27 percent more fossil energy than the fuel produced.
  - Sunflower plants require 118 percent more fossil energy than the fuel produced.

In assessing the inputs, the researchers considered factors such as the energy used in producing the crop (including production of pesticides and fertiliser, running farm machinery and irrigating, grinding and transporting the crop) and in fermenting/distilling the ethanol from the water mix. These conclusions were achieved even when we do not take into account other additional costs incurred, such as federal and state subsidies that are passed on to consumers and the costs associated with environmental pollution or degradation.

(ii) *The implications of widespread use biofuels in Europe*

Meanwhile, in the European Union, the most widely used biofuel is the biodiesel Rapeseed Methyl Ester (RME). In response to the EU's proposal to develop a Directive for the minimum share of biofuels in motoring fuels in the near future, the European Environmental Board (EEB) published a paper which among others states the following:[6]

- A unit of fossil fuel is needed in order to produce 2.5 to 3 units of biofuel. Compared to biofuels produced from tree residues, this is very inefficient, as up to 17 units of biofuel can be produced from tree residues with one unit of fossil fuel.

- The EU Commission estimated that 8 percent of the fuel market can be substituted by biofuels and 10 percent of the agricultural area of the EU (corresponding to 14 million hectares of agricultural land) would be dedicated to the cultivation of biofuel crops. This would include land taken out of food production under the Common Agricultural Policy. The use of such an enormous amount of land for biofuel production cannot be justified when there are so many better uses for this land from food safety to the production of biomass for thermal generation. Given the predicted annual growth of the transport sector of 2 percent (and without a firm policy to improve fuel efficiency at the same rate) this maximum substitution of 8 percent would be offset in less than four years by the growth in transport volume.

- The EU Commission's Directive will indeed promote an extension of the area used for intensive agriculture, and provides an inefficient solution for the tackling of climate change. Biofuel plantations require intensive farming with high-chemical input, will use large amounts of land, burden soil and groundwater, and decrease biodiversity. Regarding climate change, the benefits are very uncertain and the reduction costs are

[6] *Biofuels not as Green as They Sound*. May 2002. EEB Position Paper on the Draft Directive on the Promotion of the Use of Biofuels for Transport & the Draft Directive amending Directive 92/81/EEC with regard to the possibility of applying a reduced rate of excise duty on certain mineral oils containing biofuels and on biofuels, COM (2001) 547. http://www.eeb.org/publication/2002/EEB-POSITION-PAPER-ON-BIOFUELS-FINAL-21-May.pdf

high. Therefore, the proposal does not make much sense, neither from an economic nor an ecological point of view.

The implications for the above data suggest that intensive liquid biofuel production, especially for transport, will develop a competition in our land use patterns, of between land for food security and conservation purposes and land for fuel.

At the end of 2004, the British government set a target for the amount of its transport fuel that will come from crops. The EU proposes that 2 percent of its fuel is sourced out from biodiesel by 2005, rising to 6 percent by 2010 and 20 percent by 2020.[7] To try to meet these targets, the British Government has reduced the tax on biofuels by 20 pence per litre, while the EU is paying farms an extra 45 euros a hectare to grow them.

In the meantime, road transport in Britain consumes 37.6 million tonnes of petroleum products a year.[8] The average yield of rape is between 3 and 3.5 tonnes per hectare and a tonne of rapeseed can produce 415 kilos of biodiesel. So every hectare of arable land could provide 1.45 tonnes of transport fuel.

Thus to run British vehicles on biodiesel alone would then require 25.9 million hectares when there are only there are 5.7 million hectares of land for rapeseed cultivation in this particular country.[9] In fact, for Britain to switch to biofuels would require 4.5 times of their arable area. Even the EU's more modest target of 20 percent by 2020 would consume almost all of British cropland.

This in fact will not be happening because Britain, like the EU and other developed countries, has the ability to meet this demand by importing biodiesel from countries such as ours. This will inevitably create a competition between the demand for fuel in developed countries and the demand to satisfy the exporting nation's food security and conservation needs.

Further, the British government in a report published in November 2005, in which it announced that it would obey the EU and its bio-transport fuel quota by 2010, also admitted "the main environmental risks are likely to be those concerning any large expansion in biofuel feedstock production, and particularly in Brazil (for sugar cane) and south-east Asia (for palm oil plantations)." This report suggests that the best means of dealing with the problem is to prevent environmentally destructive fuels from being imported. However realising that this may infringe world trade rules, the British Government instead called for "some form of voluntary scheme."

(iii) *Socio-economic and environmental implications of biofuel exports*

Beyond the unit-by-unit analysis of the efficiency and impacts of biofuels, we must also keep in mind that the issue of scale is of utmost important to producing countries. The decision-making process on biofuels should not be centred on whether biocrops are good or bad in themselves. Rather, how and for whom the crops are contracted to be grown,

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[7] The European Union. May 8, 2003. *Directive 2003/30/EC: On the Promotion of the Use of Biofuels or Other Renewable Fuels for Transport.* Official Journal L 123, 17/05/2003 P. 0042 – 0046.

[8] Department for Transport. 2004. *Petroleum Consumption: by Transport Mode and Fuel Type.* http://www.dft.gov.uk/stellent/groups/dft_transstats/documents/page/dft_transstats_031767.pdf

[9] Department for Environment, Food and Rural Affairs. 2004. *Agriculture in the UK 2003.* http://statistics.defra.gov.uk/esg/publications/auk/2003/chapter3.pdf

the volume of production required and the economics of export are important factors which can help us understand the implications of biocrop development.

Today, scientists and leaders from developed countries have already called for Africa to be turned into a biofuel production zone under the guise of addressing global warming and providing many African nations which can produce biofuels cheaply with sustainable development.[10]

Thus, since oil palm can produce four times as much biodiesel per hectare as rape, and our labour costs are certainly much cheaper than Europe's, we can expect that Malaysia will also be turned into such a zone to satisfy the unsustainable demands of an ecologically damaging lifestyle. By December 2005, the media were already reporting that four refineries are being built in Peninsular Malaysia, one in Sarawak and two in Rotterdam while rival German and American consortia are building similar plants in Singapore. The report of course identifies that the 'fresh' demands will come from Europe and would at the very least, take up most of Malaysia's crude oil palm inventories.

Such a venture of producing oil palm for affluent countries will certainly have a catastrophic social impact, aggravating existing land conflicts between local communities and oil palm companies, most notably in Sarawak, not to mention other ecological impacts and irrational land-use patterns.

The two figures below show the rapid expansion of oil palm production in the country from 1985 to 2000, which had directly been responsible of reducing the diversity of our agricultural production. With the advent of palm oil biodiesel, we can expect that this diversity will further decline, increasing the vulnerability of our economy and smallholder farmers who are contracted to cultivate the crop.

Although we may believe that palm oil biodiesel may contribute to our economy and will do no harm to our food security, we must acknowledge the political structure of the present global free market. This economy has ensured the global increase in crop production for animal feed and the quintupling in the number of livestock since 1950, when there are than 800 million people who are permanently malnourished all over the globe today, simply because the highly unbalanced purchasing power between nations and communities.

We must further recognise that the present global petrol-energy economy is not at all benevolent. This fact can easily be observed in the political chaos that has characterised Middle East since the discovery of petroleum in the region. There is reasonable ground to believe that instead of economic independence, we may well be subjecting ourselves to future political domination by consumer countries if we so choose to be a major global biofuel producer.

For all the above reasons, we strongly urge the government to re-consider its decision of turning Malaysia as a major biofuel producing country.

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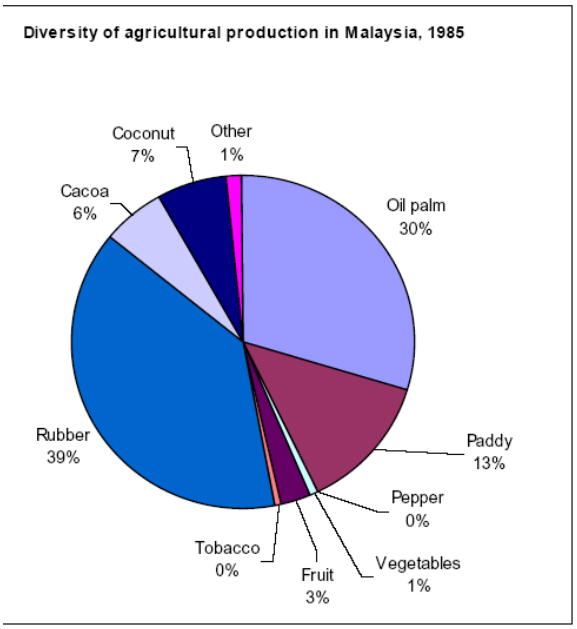
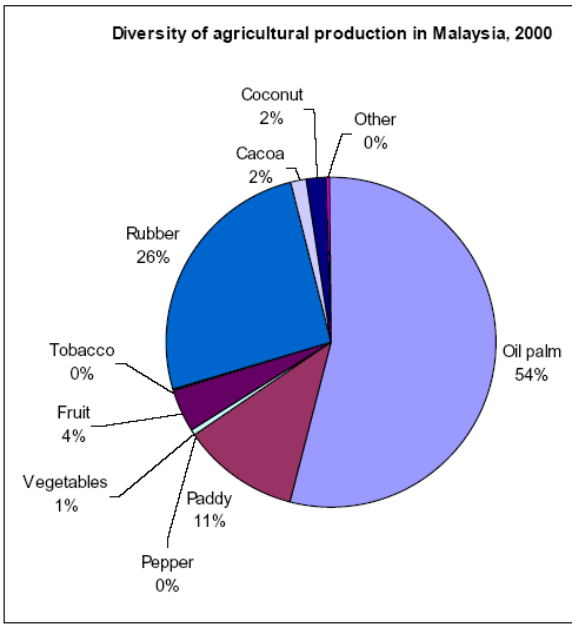
[10]Read, P. October 20, 2004. *Good news on climate change*. Abrupt Climate Change Strategy Workshop. Press Release. http://www.accstrategy.org/goodnews.html





b. Rethinking "sustainability" and "renewability"

Unsurprisingly, there are many studies which refute the findings on the inefficiency of biofuels. We thus would like to point to similar recent research findings from Berkeley and highlight the underlying inadequacies of the argument that liquid biofuels for transport are 'sustainable' and 'renewable' by highlighting certain factors that such studies tend to exclude.

Dan Kammen and Alex Farrell of the Energy and Resources Group and their students Rich Plevin, Brian Turner and Andy Jones along with Michael O'Hare from the Goldman School of Public Policy, at the University of California-Berkeley in their study deconstructed six separate high-profile studies of ethanol, assessed the studies' assumptions and re-analysed each after "correcting errors, inconsistencies and outdated information" regarding the amount of energy used to grow corn and make ethanol, and the energy output in the form of fuel and corn by-products.[11]

The research findings which were published in the journal *Science* in January 2006, concluded that once the changes were made in the six studies, each yielded the same conclusion that producing ethanol from corn uses much less petroleum than producing gasoline. The results therefore imply that it is better to use various inputs to grow corn and make ethanol and use that in our cars than it is to use the gasoline and fossil fuels directly. Despite the uncertainty, core ethanol appears to be between 10 and 15 percent better than gasoline in terms of greenhouse production.

Such standpoints in our view omitted to state the obvious. No party ever disputes the fact that fossil fuels are bad for the environment. Instead, the bone of contention in this matter is to see if this change from petroleum to crops from dedicated plantations for

[11] *Ethanol can replace gasoline with significant energy savings, comparable impact on greenhouse gases.* January 2006. http://www.berkeley.edu/news/media/releases/2006/01/26_ethanol.shtml

energy production is the soundest strategy in terms of achieving economic, energy and socio-environmental efficiency.

The answer to this question is definitely no, even if the economic and energy efficiency of such biofuels can be improved through continuous research.[12] Even if more and more economically and energy efficient biofuels can be produced, and they can well prove to be cleaner than fossil fuels in terms of emissions, the claim of "sustainability" and "renewability" will only be valid if the production of this energy is sourced out from sustainable sources and minimises the utilisation of other natural resources in its production.

For instance, this production method should include the utilisation of the available unused biomass – residual parts obtained from existing agricultural resources if we are able to ensure that more energy can be extracted from such resources than that used in its processing and distribution.[13] Only such a choice can be said to be ecologically sound since it allows us to maximise existing agricultural inputs instead of expanding our current production levels and land-use.

In addition, even with such conclusions, the 2006 Berkeley study still noted the following:

- There is still great uncertainty about greenhouse gas emissions and other environmental effects like soil erosion which must be quantified for bio-ethanol production.
- The conclusion is not a 'huge victory'. One would not go out and rebuild our economy around corn-based ethanol.
- The transition from fossil fuel would only be worth it, if the ethanol is produced not from corn but from woody, fibrous plants: cellulose. (We are agreeable to this provided the cellulose is sourced out from unused parts of existing agricultural biomass or from native grasses that can be grown sustainably for this purpose. However, we must note that cellulosic technology is still very expensive and its production processes will most likely be utilising hazardous genetic engineering technologies, which we strongly oppose.)
- There are still unknowns associated with the long-term sustainability of ethanol as a fuel, especially at the global scale. The authors urged that this will largely depend on smart land use choices.

Further, we would like to caution that some efficiency studies frequently omit the costs incurred through state subsidies and tax breaks in biofuel research, production and consumption. Such costs are often not factored in in the calculation of economic efficiency of biofuels, and in fact even fossil fuels. As a result, the real cost of biofuels

[12] In fact, the University of Wisconsin-Madison College of Engineering researchers have even recently discovered a new way to make a diesel-like liquid fuel from carbohydrates commonly found in plants, which was also reported in *Science*, in June 2005. This process is also touted as very efficient, wherein corn and other biomass-derived carbohydrates can be converted to sulphur-free liquid alkanes resulting in an ideal additive for diesel transport fuel in a four-phase catalytic reactor. This fuel apparently can produce 90 percent of the energy found in the carbohydrate and hydrogen feed, which can potentially create twice the energy than that created by corn ethanol. For more information, please see http://www.engr.wisc.edu/news/headlines/2005/Jun02.html

[13] Such decisions must also take into account if residues of particular crops are in fact best left on the field based on other environmental considerations like soil and nutrient conservation. In some cases, it is worthwhile to explore if native cellulosic plants can be utilised for energy production provided that no harmful technologies are used in its production.

(and our common energy consumption patterns) fails to be totally reflected in such studies.

David Pimentel advocates the use of burning biomass to produce thermal energy (to heat homes, for example) but he deplores the use of biomass for liquid fuel. He points out that the U.S. government spends more than US$3 billion a year to subsidise ethanol production when it does not necessarily provide a net energy balance or gain, is not a renewable energy source or an economical fuel and its production and use contribute to air, water and soil pollution and global warming, and the vast majority of the subsidies do not go to farmers but to large ethanol-producing corporations.

As such, in his view, ethanol production does not benefit the U.S.' energy security, its agriculture, economy or environment. For Pimentel, "abusing our precious croplands to grow corn for an energy-inefficient process that yields low-grade automobile fuel amounts to unsustainable, subsidised food burning."[14]

IV SOCIAL AND ENVIRONMENTAL IMPACTS OF GROWING BIOFUELS[15]

In view of the expansion of oil palm plantation for biodiesel production, we would also like to highlight the many adverse environmental impacts of such large scale plantations. The following are some of the known impacts of huge oil palm monoculture and processing.

a. Forest Destruction and Violations of Native Customary Rights

Between 1985 and 2000, the development of oil-palm plantations in Malaysia has been responsible for an estimated 87 percent of deforestation.[16] Meanwhile, in Sarawak alone, 2.4 million hectares have been earmarked for plantation development by 2004.[17] The global significance of the forest destruction in terms of biodiversity and climate change should not be underestimated – but it is the local communities who will immediately feel the impact of its destruction.

We must not ignore the critical ecological, socio-economic and cultural functions that forests play for our local communities, most of whom are indigenous communities who exercise customary rights over such land. Even if such forested areas have been logged over, they often still provide a habitat for an array of floral and faunal species, which will be totally destroyed when the forest is converted into plantations. Research has shown that an oil palm plantation can support only 0 – 20 percent of the species of mammals, reptiles and birds found in primary rainforest.[18] In addition, those species that are able to

[14] Please see 9.

[15]Parts of this section and its references are adapted from the collaborative report prepared for Friends of the Earth England, Wales and Northern Ireland *Greasy Palms, The Social and Ecological Impacts of Large Scale Palm Oil Plantation Development in Southeast Asia.* Available at http://www.foe.co.uk/resource/reports/greasy_palms_impacts.pdf

[16]Calculation based on statistics on land use changes in A. Simeh & Tengku Mohd Ariff Tengku Ahmad. 2001. Second Malaysian Plan and Third Agricultural Policy. In *The Case Study on the Malaysian Palm Oil.* Presented during Regional Workshop on Commodity Export Diversification and Poverty Reduction in South and South-East Asia, Bangkok, organised by UNCTAD in cooperation with ESCAP, April 3-5. Writers are Senior Agricultural Economist at the Malaysian Palm Oil Board (MPOB) and Senior Agricultural Economist at the Malaysian Agricultural Research and Development Institute (MARDI). Cited in Friends of the Earth England, Wales and Northern Ireland. 2004. *Greasy Palms, Palm Oil and Big Business.* Available at http://www.foe.co.uk/resource/reports/greasy_palms_buyers.pdf

[17] Malaysiakini. *S'wak to clear 2.4 mil hectares for plantations.* Dec 15, 2004. http://www.malaysiakini.com

[18]Laidlaw, R.K. 1998. A Comparison between Populations of Primates, Squirrels, Three Shrews and other Mammals inhabiting Virgin, Logged, Fragmented and Plantation Forests in Malaysia. In *Conservation, Management and Development of Forest Resources*. Proceedings of the Malaysia-United Kingdom Programme Workshop, October 21-24

survive in the new environment of the plantation frequently come into conflict with humans in and around the plantations.

b. Forest Fires

Wildfires are not a common natural phenomenon in tropical rainforest regions. However, plantations are significantly drier than forests and are therefore very vulnerable to forest fires. In 1997-98, fires raged throughout rural Indonesia, affecting no less than 6 percent of the country's total landmass. The damage inflicted by such fires and haze is catastrophic. Wildlife, natural habitats, and ecosystems in the worst affected areas were devastated beyond recovery. There were also heavy losses felt more directly by the public, including damage to health from months of breathing heavy smoke-haze, losses to businesses forced to shut down for weeks or months by the haze and interruption to transport, air-breathing machines and destruction of other economic and social resources.

c. Soil Erosion

Land clearing causes considerable increases in topsoil run-off, disturbs stream-flow and increases sediment loads in rivers and streams. Soil erosion, for example, is five to seven times greater during clearance, while sediment loads in rivers increase by a factor of four.[19] Whereas some of these impacts are temporary, the pressure on riverine and coastal ecosystems remains significant in many areas because land clearing and development is continuously taking place in different areas in the same watershed. Soil erosion is especially problematic when oil palms are planted on steep slopes and at high altitude. As suitable lowland areas become scarcer, it may well be that upland oil palm plantations will be introduced to satisfy the demand of developed countries.

d. Heavy Agro-Chemicals Use

In the oil palm plantation sector, around 25 different pesticides may be used, but because usage is not controlled or documented, monitoring is very difficult. The pesticides used in intensive agriculture, will also end up in soil, groundwater or surface waters. Here they can cause eutrophication or toxification of ecosystems, which have consequences for ecosystem health and biodiversity.

The most commonly used weed killer in Southeast Asia's oil palm plantations is paraquat dichloride. This herbicide is very toxic, may be fatal if inhaled, ingested or absorbed through the skin and its effects are irreversible. There is no known antidote to paraquat poisoning. Agricultural workers are regularly exposed to this toxic substance during handling and mixing, spraying and working in freshly-sprayed fields. Paraquat is persistent and accumulates in the soil with repeated applications.

Women, who due to their physiological makeup are more vulnerable to the harmful effects of agrochemicals than men, are predominantly responsible for mixing, handling

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1996; K.B. Heang & L.Boo Liat. 1998. *To Determine the Effects of Logging and Conversion of Primary Forest to Tree Crop Plantations,on Herpetofaunal Diversity in Peninsular Malaysia*. Proceedings of the Malaysia-United Kingdom Programme Workshop, October 21-24 1996; Henson, I.E. 1994. *Environmental Impacts of Oil Palm Plantations in Malaysia*. PORIM Occasional Paper No. 33; Danielsen. F. & M. Heegaard. 1995. Impacts of Logging and Plantation Development on Species Diversity: A Case Study from Sumatra. *In Management of Tropical Forests*. Oslo: University of Oslo, Centre for Development & the Environment; SUM Occasional Paper, 1/95.

[19] Henson, I.E. 1994. *Environmental Impacts of Oil Palm Plantations in Malaysia*. PORIM Occasional Paper No. 33.

and spraying pesticides on palm oil plantations. Thus, our female workers in plantation estates are disproportionately unhealthy compared to other women. In 2002, Pesticide Action Network (PAN) Asia/Pacific and Tenaganita, in collaboration with the National Poisons Centre, published a study of female plantation workers confirming widespread pesticide poisonings and significant problems associated with paraquat. Approximately 30,000 women work daily as pesticide sprayers in Malaysia; many have shown acute paraquat poisoning symptoms, including nosebleeds, eye irritation, contact dermatitis, skin irritation and sores, nail discoloration, nail loss and abdominal ulceration.[20]

Paraquat is banned in Austria, Denmark, Finland and Sweden, and is seriously restricted in Germany. In August 2002, the Malaysian government also announced its intention to ban all production of paraquat through a two-year phase-out process. However due to pressure from the pesticide industry, this ban will be lifted in mid-2007.

e. Palm Oil Mill Effluent (POME) Pollution

Due to that fact that fresh fruit bunches of palm oil need to be processed within 24 hours of harvest, a crude palm oil (CPO) mill is usually built for about every 4,000 - 5,000 hectares of plantation. This means that hundreds of processing facilities operate throughout the countryside of Malaysia. Of the various types of waste produced, POME is responsible for the most pollution. POME is a mixture of water, crushed shells and a small amount of fat residue. Most CPO mills have outdoor basins in which POME is stored and somewhat detoxified (by adding oxygen) but these basins easily overflow during heavy rain or intensive production. Some companies allow the liquid to flow directly into the rivers. Because of its high Biological Oxygen Demand (BOD), POME is highly polluting to waterways and has significant negative effects on aquatic life downriver. Villagers interviewed in Indonesia often report that local fish stocks in rivers and lakes declined and that their potable and bathing water sources turned brown and smelt foul after oil palm was introduced to their areas. In PNG, West New Britain village women have also reported significant increases in birth defects, fertility and maternity problems associated with oil palm pollution.[21]

f. Unsubstantial CO2 Saving Potential of Biofuels

Many parties seem to believe that the production of biofuels will offer substantial reductions in greenhouse gas emissions in comparison to petroleum consumption. In truth, although biofuels do offer some reductions in greenhouse emissions, these are by no means substantial, due to the fossil energy required to produce the fuels.

Estimations of the savings in greenhouse gas emissions vary widely. For RME, CO2 savings found in studies and reports lie in the range of 25 to 80 percent.[22] This means that 25 to 80 percent less CO2 is emitted using RME instead of fossil diesel for the same purpose. However, besides CO2, another greenhouse gas, N2O, is also emitted in the biofuel lifecycle, due to the application of nitrogen fertiliser in rape cultivation. N2O has a high potential factor for global warming; about 270 times higher than CO2.

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[20] *News Note: Malaysian Paraquat Ban Threatened*. http://www.panna.org/resources/gpc/gpc_200304.13.1.15.dv.html; *Paraquat: Syngenta's Controversial Herbicide.* April 2002; *Berne Declaration.* Quellenstrase 25, PO Box Ch-8031 Zürich, Switzerland; *Poisoned and Silenced: A Study of Pesticide Poisoning in the Plantations.* Tenaganita & PAN Asia Pacific.

[21] East New Britain Social Action Committee (ENWSEC). 2003. *Oil Palm Case Study - West New Britain & Consequences for East New Britain.*

[22] Please see 4.

When we compare this with other alternatives for reducing emissions, for instance like reducing private vehicle travel, insulation of homes in colder climates, forest conservation and suchlike, which have the same – or lower – costs and a much larger potential for CO2 reduction, the switch to methyl ester does not at all seem like the most practical choice.

g. Unresolved Plantation Labour Issues

In Malaysia, some 400,000 people are directly employed by the oil palm sector. Besides health problems faced by plantation workers due to heavy and repeated exposure to agro-chemicals as discussed above, the terms of plantation labour are still very poor in this country.

The guaranteed minimum wage for plantation workers is still unacceptably low and it has often been pointed out that plantation developers reek huge profits by keeping the wages of their field workers low. In some instances, the workers' children may still need to assist their parents who may have to collect 1.5 to 2 tons of palm fruit each day.

A significant share of the current plantation workforce in Malaysia also comprises legal and illegal foreign workers, mainly from Indonesia, in particular in Sarawak and Sabah, who are subjected to harsher working conditions and other forms of labour exploitation. The widespread use of foreign labour also puts into the question the argument that oil palm will increase employment for local people.

The accident rate in the plantation sector is also higher than in other sectors in Malaysia. In 1999 and 2000, the plantation sector alone contributed 14 percent (or 12,753 cases out of 92,704 cases in 1999) of industrial accidents. The reason for this high accident rate is the nature of the fieldworkers' working environment. Accidents often occur because of sharp thorns, branches and the fruit of the oil palm and/or by use of the long-handled implements or by exposure to pesticide.[23]

Further, plantation labourers are also often deprived of the commonly acceptable standards of employment security and the protection of their rights. They may be subject to higher income fluctuations, live in substandard housing conditions provided by the plantation developers and have little access to clean water, quality healthcare and education. The problem of alcoholism has also often been documented among plantation workers in the country.

V RECOMMENDATIONS

To push the effective commercialisation of sustainable and renewable energy sources, we must therefore develop policies which can drive down their production and distribution costs, which is mainly research and development; and the incorporation of environmental concerns into our commercial calculations on energy use.

There are certainly other ways of ending our dependency on fossil fuels. To this end, we must introduce better and more stringent criteria and standards on the constitution of sustainable and renewable energy sources. This can then pave the way for advances in

[23] Takayama G. & Matsubara T. *The Oil Palm Plantation Worker in Peninsular Malaysia: Trends and Problems*. 2001. Writers are M.S. candidate at the School of Natural Resources & Environment, University of Michigan & M.A. candidate at the Institute of East Asian Studies, Universiti Malaysia Sarawak respectively.

the appropriate technologies, infrastructure and the economic policies to support the development of such energy sources.

SAM would like to recommend that the following considerations are first taken into account before we embark on exporting biodiesel on a large scale:

- Malaysia must develop an energy policy which is committed to reducing and stabilising our energy consumption levels, to prevent us from making the same mistake as other economically powerful nations.

- We must conduct comprehensive research, which involves various multi-stakeholders, to properly study the impacts of exporting biodiesel to such economies. The areas of study should involve, but are not limited to, the environment, financial and economic stability, food security, land use patterns, local communities and the rights of plantation labour.

- The developments of biofuel plantations should not involve forest conversions and encroach into land where Native Customary Rights are exercised.

The EEB meanwhile has developed two main conditions for the sustainability criteria for biofuels, which we think should be considered:[24]

- The biofuels need to have a net CO2 emission reduction throughout the total supply chain (after reduction of emission in the production chain of CO2 equivalents). In the short term the net gain in CO2 emission should be at least 50 percent in order to qualify for tax measures. In due course the perspective has to be that it can be developed into 80 percent net gain of CO2 compared to fossil fuels.

- The biofuels should furthermore fulfil a set of criteria concerning the origin, the production chain and social aspects. It is important that the production of biomass not only not exacerbates the negative environmental impact of many current farming practices but in fact constitutes an improvement to the current situation and helps meet other environmental objectives, apart from climate change.

The following are then some of the practical alternatives which can assist us in making the best possible decisions with regard to our future energy use.

- We must change our transport policies to one which can guarantee access to the public and respect ecological needs at the same time. Our current transport policies seem to create the false impression of an unlimited growth potential for the transport sector when our environment is showing signs of being overburdened. We must therefore within a maximum of 20 years, stabilise the total distances travelled, and achieve a 50 percent reduction of total energy consumption in the transport sector. To really tackle environmental problems, we need more structural changes, such as support for public transport, switching from road transport to rail or waterways, stimulating people to use their private motorised vehicles less and encourage the use of non-motorised vehicles like bicycles. As for the developed countries, it is also clear

[24] *EEB Position on Biomass and Biofuels: The Need for Well-defined Sustainability Criteria.* December 2005. http://www.eeb.org/activities/agriculture/EEB-position-on-bioenergy-191205.pdf

that the most environmentally and socially benign solution for the matter is in fact for them to reduce their consumption levels. Switching to "greener fuel" will not be sufficient without reducing the demand of private vehicle and air travel.

- For our own consumption, given local realities, the most sustainable, renewable and practical energy source would be solar. The money diverted from tax breaks and the like to promote biofuels must instead be spent in improving the efficiency of a variety of solar technology, from solar thermal conversion, including solar ponds and parabolic troughs to photovoltaic systems. It would be a great shame if Malaysia, with its abundance of sunshine does not become the world's leading producer and consumer of solar energy in the near future. There are obvious reasons as to why solar energy has yet to achieve widespread use around the world today. Firstly, the funds that could have been used to improve the technology have clearly been diverted elsewhere. Second, the global energy industry is generally reluctant to make heavy technical and strategic investments to promote the gradual cost-effectiveness of renewable energy sources. Our global fossil fuel industry players are in fact directly delaying the advent of decentralised energy systems which would bring in lesser economic gains for them and prefer the market to exploit fossil fuels to the last bit.

- Another alternative would be to produce bioenergy from agricultural residues like straws from rice-farming and the like. However we must ensure that this strategy is also not at the expense of soil and nutrient conservation and must not utilise harmful technologies like horizontal gene transfers. In addition, other technologies which should be explored are the use of biogas derived from organic compost, which can indeed be done if we also enforce a nationwide waste separation and recycling programme, which also have other clear environmental profits; as well as obtaining energy from oils and derivatives from animal slaughter house waste.

- We can also reduce greenhouse gas emissions from transport by supporting the improvements in the efficiency of fuels and engines including technical adaptations made in vehicles and improvements made in the mileage of hybrid electric cars. If only the mileage of hybrid cars can be doubled, petroleum consumption in the U.S. can be cut by one-third. In another development, Volkswagen has also apparently launched a prototype which runs 100 kilometres on one litre of diesel. The existence of these kinds of technologies should be recognised by the government – we can in fact develop binding agreements with the car industry to promote more efficient technologies.

VI CONCLUSION

From the above we can deduce the following conclusions:

- Northern countries should first develop stringent policies to reduce their energy consumptions and attempt to find solutions to their energy needs locally.
- The switch from fossil fuels to biofuels is unlikely to be cost and energy effective. In fact, promoting the production of biofuels for export will only encourage irrational land use patterns, skew food prices and interfere with our existing agricultural and conservation commitments. Thus, developing dedicated plantations for the production of biodiesel for export is not the wisest economic, environmental and social option. The greenhouse gas savings from the widespread use of biofuels will not be significant

and there is not much climate gas gains can be expected from this switch in energy supply.

- Intensive oil palm plantation still carries unacceptable levels of environmental and social impacts, including violations of native customary rights and labour rights.
- The country should focus on fulfilling its own energy requirements by promoting energy conservation, a sustainable transport policy and the development of renewable and decentralised energy systems.
- The most ecologically sustainable source of biofuels should be from available unused biomass e.g. residual parts obtained from existing agricultural resources and other wastes, provided we are able to extract more energy from such resources than that used in its production and distribution and no harmful technologies are utilised in its production processes.

The NBP directive policy directive will indeed promote an extension of the area used for intensive agriculture which requires high-chemical input and provides an inefficient solution for tackling climate change and other environmental problems. The biodiesel industry from dedicated plantations will burden soil, rivers and our groundwater, and decrease biodiversity as well as encourage land rights violations of our indigenous communities, turning rural landowner communities into labourers. Such a policy does not make much sense, neither from an economic, energy, nor an ecological point of view.

With all the information above, it is difficult to accept that the expansion of oil palm plantation for the production of export-oriented biodiesel will actually fulfil the two visions of the NBP i.e. introducing biofuels as sustainable and viable sources of energy and enhancing the prosperity of all stakeholders in the agriculture and commodity-based industries through stable and remunerative prices.

The intention of the NBP to consider incentives for projects related to the promotion of biofuels including those for strategic or high technology projects and the commercialisation of research and development findings of the public sector in resource-based industries may well block the eligibility of the development and production of other sources of energy to tax reduction. Such a policy ensures that instead of giving other renewable energy sources a chance to become competitive, they are in effect excluded for tax exemptions altogether. In short, this push for oil palm biodiesel will divert funds which can be used to promote other more sustainable and renewable sources like solar.

This accompanying monetary loss incurred by the state means that less money will be available for other government tasks as well, for instance for the costly measures required for CO2 savings. The money undertaken to achieve CO2 savings should be used to fund measures which achieve the best possible results. However, we have already illustrated how CO2 savings are both environmentally and ecologically costly in the case of biofuels, and the reduction in the state revenue from fossil fuel taxes cased by tax breaks on biofuels, would also be very costly.

The Malaysian Government should not allow efforts of increasing renewable energy use in the transport sector being turned into an environmentally destructive, and economically unreasonable, agricultural subsidy policy.

Although we welcome the government’s intention of finding a better solution to our petroleum dependency and greenhouse gas emissions and other environmental problems

caused by fossil fuel burning, we do not think that the NBP represents the right way of tackling these issues. In fact such solutions may directly aggravate our existing social, political and environmental problems.