

In no other region in the world is the absurdity of the frenzied rush into agrofuels more blatant than in Asia, particularly in Indonesia and Malaysia. Far from helping to reduce global warming, it is leading to a big increase in global carbon emissions. Just as serious, it is cementing the control over large areas of land of industrial groups that are amongst the most ruthless in the world in terms of environmental destruction, labour conditions and human rights abuses.

Agrofuels in Asia

Fuelling poverty, conflict, deforestation and climate change

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Even before the current stampede into agrofuels, Indonesia was beginning to contribute significantly to the emission of greenhouse gases, not through its lifestyle, but through the drying and burning of peat. Emissions of peat lands are currently not included in official statistics. If they were, Indonesia would rank third among emitters (behind the USA and China), rather than 21st, where it is currently placed.¹ If all the carbon in South-east Asia's peat, possibly as much as 50 billion tonnes, were allowed to enter the atmosphere it would make a highly significant contribution to global warming.²

Large-scale peat drainage started in 1996 with Suharto's disastrous Mega Rice Project in central

Kalimantan (the Indonesian part of the island of Borneo) and continued with the expansion of timber and oil-palm plantations. Before the plantations could be created, the area had to be drained and, as this happened, the peat began to oxidise and to emit carbon dioxide into the atmosphere. At the same time, the peat began to desiccate, turning into a tinder box that would ignite during the dry season. In 1997 and 1998 fires raged through 6 per cent of Indonesia, burning 11.7 million hectares of land. During these fires Indonesia's peat released into the atmosphere a huge amount of carbon dioxide, equivalent to 13–40 per cent of global fossil fuel emissions that year. Peter Aldhous, editor of the science journal *Nature*, used quite uncharacteristic language to describe the impact of the burnings in Borneo: "He [Suharto] succeeded only in creating

¹ <http://tinyurl.com/yymeth>

² Fred Pearce, *The Last Generation*, Eden Project Books, 2006, p. 99

a smouldering heap of ash that blights the lives of local people – and threatens to destabilize the global climate by belching vast quantities of carbon dioxide into the atmosphere.”³

Since then, peat drainage and annual fires have continued to emit up to 1 billion tonnes of carbon into the atmosphere every year, and peat drainage is now accelerating with the creation of further oil-palm and timber plantations. The destruction to date already gives cause for grave concern yet much worse undoubtedly lies ahead. Palm oil is by far the most energy-efficient feedstock for biodiesel. Yields from palm-oil diesel are five times higher than

It seems scarcely credible, but this suicidal policy is being promoted as part of a global strategy to mitigate global warming. In an extraordinary exercise in blinkered thinking, parties to the Kyoto Protocol can ignore the carbon emissions caused by the destruction of peat and fund South-east Asia’s palm-oil and biomass industry through the Clean Development Mechanism (CDM), which has as one of its key planks the promotion of agrofuels. The agrofuel market is being artificially boosted by government targets, subsidies and other incentives, with little attention being paid to where agrofuel crops are being planted and the environmental damage their cultivation may cause.



An Indian advertisement for maize-based agrofuel

those from rapeseed oil and three times higher than those from jatropha. This means that the present agrofuels frenzy is likely to lead to an uncontrolled expansion in palm-oil production in many parts of South-east Asia. Just over half (55 per cent) of the region’s peatlands remain undrained, and it seems almost inevitable that over the next few years almost all of it will be transformed into giant biodiesel plantations, mainly of oil palm. Barring a policy U-turn, this will lead to an additional 42–50 billion tonnes of carbon being belched into the atmosphere in the coming years. This could well make it impossible to stabilise the global climate, even if fossil fuel emissions are cut drastically.⁴

The Kyoto Protocol gives Annex I countries (that is, industrial countries that have signed up to Kyoto) a strong incentive to set agrofuel targets: instead of having to reduce fuel use or force the automobile industry to make only fuel-efficient cars, countries can claim that they have reduced their greenhouse gas emissions by using agrofuels. Even though the true carbon emissions from the deforestation and peat drainage linked to agrofuel production can far exceed those of the mineral oil they replace, they don’t have to be counted because they happen in the global South, where there are no caps on carbon emissions. Agrofuels thus allow rich countries to claim credits for “emission reductions” when they

³ Peter Aldhous, “Land Remediation: Borneo is burning”, *Nature*, 6 January 2005, p. 13.

⁴ For references about plantation expansion and peatland emissions, see <http://tinyurl.com/yqf2lb>

have effectively exported them and, overall, helped to accelerate global warming.

So far, no CDM funding has been granted to manufacture liquid agrofuels, be it ethanol or biodiesel, but discussions are under way about making them eligible for large-scale carbon credits. The issue is controversial and a UN panel of experts (Methodology Panel) is recommending that the first application for carbon credits for palm-oil production for biodiesel in South-east Asia be refused because it could lead to more deforestation.⁵ However, political pressures are strong and this recommendation could be ignored.

Ambitious expansion plans

Malaysia expanded oil-palm plantations to 4.17 million hectares in 2006, with the most rapid expansion in Sarawak and Sabah on Borneo. The country is the world's largest producer and exporter of palm oil, with a 45 per cent share in global palm-oil production, compared to Indonesia's 39 per cent. Malaysia's per hectare yields are about twice as high as Indonesia's, and production is more intensive, with a high use of fertilisers and pesticides (including the highly poisonous paraquat – now used legally again after a four-year national ban).

Indonesia, however, intends to overtake Malaysia. Over the next 20 years, it plans to increase palm-oil production 43-fold, with the area under cultivation expanding from 6.4 million hectares in 2006 to 26 million hectares in 2025.⁶ Plans for large-scale sugar-cane and jatropha plantations, also for agrofuels, are being drawn up at the same time.⁷ But the expansion may not be quite as fast as the government hopes. Some 12 million more hectares have already been deforested, supposedly for oil palms, but have not been planted. This has fed suspicions that some of the companies are primarily interested not in agrofuels but in quick profits from timber sales. Indeed, Indonesia's palm-oil yields continue to be well below the global average, and it is by no means certain that the plantation owners will heed the government's exhortations to invest the money required to achieve large productivity increases. Much will depend on the global biodiesel market, which is the main driver of palm-oil prices. At the moment high palm-oil prices are promoting investment in oil-palm plantations, mills and biodiesel refineries, and the government keeps granting new concessions for large areas of land directly in response to high biodiesel demand and crude palm-oil prices. In 2006, media reports about strategic alliance talks between Indonesia and

Malaysia were published which suggested plans for a crude palm-oil cartel, though no final decisions have been announced so far.⁸

For the moment at least, there is little need for a cartel. Rising palm-oil prices are accelerating expansion in mainland Malaysia, West Papua and Sulawesi, and the agrofuel industry is establishing a foothold elsewhere in South-east Asia. Cargill, for example, is increasing its investment in oil-palm plantations and mills in Papua New Guinea, and the PNG government is drawing up a strategy for turning the country into a major agrofuel producer. Thailand is importing palm oil and expanding its own plantations, and the number of oil-palm plantations in the Philippines is also growing – though Indonesia's expansion plans are by far the most ambitious in South-east Asia. While Malaysia and Indonesia are also looking at other agrofuel feedstocks, such as sugar cane and jatropha, their biofuel strategies rely primarily on palm-oil expansion.

Local communities pay the cost

*"It's as if we were ghosts on our own land. We have been so pierced through by the spines of the oil palm that we are almost dead, left haunting what once was our own land"*⁹

The people of Indonesia and Malaysia will pay twice for this misguided "climate strategy": rapid global warming will threaten the lives of ever larger numbers of Indonesians, with 2,000 islands at risk of being submerged in coming decades; and many communities will lose their livelihoods as millions of hectares of land are turned into agrofuel plantations. Indigenous and local communities will be disproportionately affected, because palm-oil expansion is happening largely at the expense of rainforests, peatlands and lands under "customary rights", i.e. belonging to them. At a meeting of the UN Permanent Forum on Indigenous Issues in May, chairwoman Victoria Tauli-Corpuz warned that 60 million indigenous people worldwide, 5 million of them in West Kalimantan, are likely to be driven off their land in the near future to make way for agrofuel plantations.¹⁰ Many of them have already had their lives severely disrupted by logging, and in some ways the agrofuels boom is no more than the intensification of a model of destruction already under way. Many of the palm-oil and biodiesel companies belong, in fact, to groups which have been profiting from logging and the timber trade for decades.



5 <http://tinyurl.com/ys2u6f>

6 For details of the expansion programme and the main investors in Indonesia, see Marianne Klute, "Green Gold Biodiesel: Players in Indonesia", January 2007. <http://tinyurl.com/33lb7r>

7 Ibid.

8 <http://tinyurl.com/2u43ay>

9 Forest Peoples Programme and Sawit Watch, "Ghosts on our own land", 2006. <http://tinyurl.com/333yog>

10 <http://tinyurl.com/38mf6>

Indonesia suffers agrofuel fever

Rukaiyah Rofiq

Indonesia is living with a paradox: it is a palm-oil producing country yet its people are experiencing a serious shortage of cooking oil. In almost every city in Indonesia, people are having to queue for oil and, when they find it, it is always more expensive than the last time they bought it. The price of cooking oil has increased from 6,500 rupiah per kilo, first to 7,500, then to 9,000 (Rp9,000 = US\$1). It is becoming very difficult for poor people to buy cooking oil. Some local companies, such as potato chip manufacturers, are facing bankruptcy. The government has responded with a so-called “market operation”, that is, by selling cheap cooking oil. But so far this tactic is not working: the oil is of inferior quality, and it is not being sold in sufficient quantities to push down the market price.

The government created a wonderful dream for us. They told us that the big oil-palm plantations would bring us prosperity. And people bought into this vision. In the province of Jambi, for instance, 403,467 hectares of land were planted with oil palm. Production reached 4,682,975 tonnes in 2005. So why isn't it working? Why are we getting poorer rather than wealthier?

What is happening is that the Indonesian people are being sacrificed to the export market. The government tells the giant companies, such as the Wilmer Group, PT Perkebunan Nusantara, PT Smart Tbk and PT Musim Mas, that they must provide 150,000 tonnes of palm oil each month for the cooking-oil needs of the population. But the companies get much higher prices on the export market, so they provide only 100,000 tonnes a month. There is an agrofuel fever on the world market. When do big companies think of the needs of the local population when there are big profits to be made abroad?

What we are experiencing now is struggle between those who want the palm oil to be used as food by ordinary people and those who want to send it abroad to be used as fuel for vehicles. And the fight between the human being and the machine is being won by the machine.

Palm oil is being produced to provide a supply of renewable energy for vehicles. The intention is to reduce carbon emissions. Yet the process of setting up these plantations is causing widespread social and environmental damage. Palm-oil feedstock has turned into a curse for millions of people in Indonesia.

So what are our demands?

1. The government must impose restrictions on the export of crude palm oil by the big companies, and these restrictions must be enforced.
2. The government must carry out an in-depth study into the palm-oil market, looking at the capacity of the industry to supply the domestic and external markets.
3. There must be a moratorium on further investment in the oil-palm plantation sector until there has been a proper analysis of the social and environmental impacts of such plantations.

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The agrofuel frenzy is sounding the death knell for most of the region's forests, many of which have already been heavily felled. The United Nations Environment Programme warns that, within 15 years, 98 per cent of Borneo's and Sumatra's rainforests – some of the most biodiverse ecosystems on earth – will have been destroyed. The total number of people living in classified “State Forest Areas” in Indonesia could be as high as 90 million,

and of these, according to Watch Indonesia, some 45 million depend on the rainforests for their food and livelihoods.¹¹ Indonesia's government hopes that palm-oil expansion for biodiesel will create 5 million jobs, a figure that Watch Indonesia believes could be far higher, perhaps even twice this. Even so, this would leave 35 million people facing destitution. According to Marianne Klute of Watch Indonesia, “Sumatra already resembles a

¹¹ Forest Peoples Programme, Sawit Watch, HuMA and ICRAF, Bogor, “Promised Land: Palm Oil and Land Acquisition in Indonesia – Implications for Local Communities and Indigenous Peoples”, 2006. <http://tinyurl.com/2tjtz>



single mega-plantation. Now Kalimantan is being transformed into a kind of greenhouse where fuel is produced for the energy needs of the industrial countries.¹²

Not surprisingly, the land appropriation is generating conflict. By the end of 2006 there had already been some 350 conflicts in Indonesia. Indonesian NGO Sawit Watch recently warned in an Open Letter to the European Union: "These unresolved conflicts will get worse if the current biofuels policy is put in place. They will deprive further local communities and indigenous peoples of their lands and livelihoods."¹³ Thousands of communities, formerly self-sufficient in food from forest ecosystems and traditional agriculture, now have to purchase rice on the domestic market, putting further pressure on Indonesia's rice supply, which is already under strain from global warming and land conversion to non-agricultural developments.

Sawit Watch has shown that most of the concessions for oil-palm cultivation are unconstitutional in that they take no account of the customary rights officially enshrined in Indonesia's constitution. In March 2007 the organisation Save Our Borneo said that the customary rights of 2,000 Dayak communities in central Kalimantan were threatened by palm-oil expansion plans. There are regular reports of human rights abuses – imprisonment as well as murders – against those resisting land takeovers by companies or protesting about poor working conditions. The aggressive expansion of oil palm is likely to exacerbate the human rights situation, particularly in areas, such as Aceh or West Papua, where there are already conflicts over other issues.

About one third of oil-palm plantations in Indonesia are held by smallholders, and the government's expansion plans foresee a scheme by which a large plantation will lie at the centre of each production unit, surrounded by a large number of much smaller plots. Many smallholders have been pressured into accepting land title deeds for less than half the area they were cultivating previously. Moreover, the smallholders are rapidly losing their autonomy, for they incur debts converting their land to oil-palm plantations and then become dependent on the plantation owners for the crushing and sale of their produce. When interviewed by Sawit Watch, many said that palm oil did not offer them a sustainable livelihood.¹⁴

Malaysia, meanwhile, does not fully recognise customary or indigenous land rights, and land

conflicts are particularly common in West Malaysia and Sarawak, where plantations are being established on land claimed by indigenous Orang Asli and Dayak communities. The government plans to develop one million hectares of oil palms in Sarawak on land under Native Customary Rights.

Who is behind South-east Asia's agrofuel industry?

South-east Asia's agrofuel industry is barely two years old, yet it has already provoked an extraordinary investment frenzy and attracted billions of dollars of national and international capital investment. Both the Malaysian and Indonesian governments are supporting the expansion of the industry with tax breaks, subsidies, state company investment and domestic agrofuel targets, and both have ring-fenced 40 per cent of crude palm oil for biodiesel. By the end of 2005, Malaysia had 58 licensed agrofuel investors, the largest of which were the Malaysian companies Golden Hope, IOI Corporation, Kulim and Carotino. In Indonesia the largest investment deal was clinched at the beginning of 2005, when PT Smart (Sinar Mas Group) finalised a US\$5.5-billion investment deal with China National Offshore Oil Corporation (CNOOC) and Hong Kong Energy. Another large Indonesian business group, Raja Garuda Mas, announced a US\$4-billion investment deal in May this year, which includes oil-palm plantations and a new biodiesel refinery on Sumatra.

Sinar Mas, Raja Garuda Mas and the Salim Group were amongst Suharto's cronies. Having lost some of their power after Suharto was overthrown, they have now strengthened their position under decentralisation and, according to some reports, operate as a state within a state, dividing up Kalimantan among themselves and ruling with the help of paramilitaries. They have close links with China, and all three groups gained notoriety in the destructive timber trade. APP and APRIL, the companies that bear much of the responsibility for the destruction of Sumatra's rainforests, now form part of groups which are destroying Kalimantan's and West Papua's forests for palm oil (extracting and selling the timber in the process).¹⁵ While the palm-oil biodiesel boom reinforces the power of old elites, new players are also entering the market, sometimes forming close links with older business groups.

Other important investors in palm-oil biodiesel are the older Indonesian Bakrie group, also amongst the Suharto cronies but without links to China,



12 Watch Indonesia, "Fremdwort Nachhaltigkeit", 2007. <http://tinyurl.com/2w8a7n>

13 Sawit Watch, "Open Letter: Palm oil for biofuels increases social conflicts and undermines land reform in Indonesia", January 2007. <http://tinyurl.com/yq5nur>

14 Forest Peoples Programme and Sawit Watch, "Ghosts on our own land", 2006. <http://tinyurl.com/333yog>

15 For details of the expansion programme and the main investors in Indonesia, see Marianne Klute, "Green Gold Biodiesel: Players in Indonesia", January 2007. <http://tinyurl.com/331b7r>

and large Malaysian and Singaporean companies, such as Wilmar International. In May 2007, the Chinese company CNOOC announced plans to build three biodiesel refineries in West Kalimantan, apparently as the sole shareholder. Multinational companies such as Archer Daniels Midland (ADM) and Cargill are also investing directly in South-east Asia, while energy companies such as Shell, Neste Oil, Greenergy International and BioX Group are either entering into partnerships with other palm-oil biodiesel companies or, as is more often the case, importing large quantities of South-east Asian palm oil. The booming sector is attracting large amounts of major venture capital, with fund holders such as the Carlyle Group and Riverside Holdings making multi-billion-dollar investments in biodiesel companies which intend to import crude or refined palm oil for biodiesel. This investment will soon be boosted by international financial organisations: both the World Bank and the Asian Development Bank have said that they will prioritise funding for agrofuel production in developing nations.

The main markets for South-east Asia's palm oil for biodiesel are China and Europe. India continues to be amongst the three main palm-oil importers, though it prefers home-grown jatropha to imported feedstocks for agrofuels. This policy has angered South-east Asian governments yet, even without India importing biodiesel, global demand for palm-oil biodiesel already outstrips the growth in supply. Palm oil is used not just for biodiesel but increasingly for heat and energy production: in Germany most combined heat and power generators run on palm oil,¹⁶ while BioX in the Netherlands is about to open two power plants which will use palm oil. In the US, Imperium Renewables is building the first large biodiesel refinery to handle large amounts of palm oil from Malaysia, while Australia opened its first palm-oil biodiesel refinery in November 2006. This year's ASEAN Conference reaffirmed strong regional support for agrofuels, a position which was warmly welcomed by the European Union.

Despite the heavy investment, the agrofuel industry does not see palm oil as more than a transitional fuel source, which should be replaced by more efficient cellulosic ethanol within 15 years. From their point of view, this is just as well, for soil erosion and fires will ensure that South-east Asia's biodiesel boom is short-lived. Biodiesel plantations are expanding quickly on the 20 million hectares of peat lands and, once peat oxidation is complete, no soil will be left. The white sandy soil in other parts of Borneo will fare little better. According to

US academics Lucas and Tadeus Patzek, soil erodes in mountainous parts of Indonesia 30 times faster than in the US.¹⁷

"Sustainable agrofuels": false promises and solutions

There are few open defenders of rainforest destruction for the production of agrofuels, and the environmental devastation caused by palm-oil expansion in Indonesia has become an embarrassment for many agrofuel companies and lobbyists. So much so that two leading UK agrofuel companies (D1 Oils and Greenergy Biofuels Ltd) do not mention their use of palm oil on the main pages of their websites. The Malaysian government, under strong influence from the Malaysian Palm Oil Board, tries to deflect criticism to their southern neighbour, Indonesia, and claims that neither deforestation for palm oil nor peat fires are happening in its country, despite satellite evidence to the contrary. In response to the critics, several governments and companies are developing "sustainability standards", so far without any involvement of southern NGOs. Proposals discussed in Europe range from a total import ban on palm oil (rejected by the European Parliament and the European Commission), via mandatory certification with the possibility of selective import bans, proposed by the Dutch Cramer Commission, to the mere self-reporting requirement promoted by the UK's Low Carbon Vehicle Partnership.

At the international level, the Roundtable on Sustainable Biofuels, in consultation with industry, is drawing up 'standards', again without any southern NGO participation. The main proposal seems to be to divert production away from primary forest to "degraded wastelands" – even though those wastelands are very often community or small farmers' lands – or to logged forest, even though this is still rich in biodiversity compared to the green deserts of oil-palm plantations. Even these inadequate standards would rely on the goodwill of corporations like Sinar Mas and Raja Garuda Mas, renowned for having in the past broken every single agreement to protect national parks and so-called "high conservation value forests".

Another idea is that biodiesel should be made from rapeseed, seen as a sustainable alternative to palm oil. Although this is not a satisfactory solution from an environmental point of view – because, according to the European Environment Agency, oilseed-rape monoculture is seriously harming Europe's biodiversity – it is at least true that Europe has no rainforests to destroy. However,

¹⁶ <http://tinyurl.com/3xxros>

¹⁷ Lucas and Tadeus Patzek, "The Disastrous Local and Global Impacts of Tropical Biofuel Production", *Energy Tribune*, 6 March 2007. <http://tinyurl.com/37z6gw>



the underlying argument in favour of rapeseed oil – namely, that it will reduce demand for palm oil – does not appear to be valid. The Food and Agriculture Organisation believes that, on the contrary, the increased use of rapeseed for biodiesel production has become one of the driving forces behind the rise in palm-oil prices worldwide. This is because food and chemical companies are increasingly turning to palm oil now that rapeseed and other alternative vegetable oils are being used for fuel.¹⁸ This means that the expansion in rapeseed-oil biodiesel in Europe is now one of the driving forces for rainforest destruction in South-east Asia.

However unpalatable it may be to the agrofuel lobby, the truth is that there is no known policy mechanism by which it is possible to produce large amounts of agrofuels without devastating forests, farmlands and peatlands in South-east Asia and other regions in the global South. It is a basic law of economics that heavy demand will lead to higher prices, which will lead to greater supply. The only effective long-term solution is for the developed world to reduce its demand for fuels. Because they do not want to accept this basic truth, agrofuel advocates are, somewhat bizarrely, proposing the use of force to override market pressure. The United Nations Environment Programme, which is an enthusiastic supporter of agrofuel expansion, is calling for international funding for paramilitary

“rangers” to patrol national parks and to protect Indonesia’s biodiversity.¹⁹ The only way they can see of protecting species and high-biodiversity areas while promoting large-scale agrofuel expansion is to rely on the same paramilitary forces that until now have operated largely to enforce the rule of the palm-oil and timber companies.

Conclusion

Within less than two years, a multi-billion-dollar agrofuel industry has developed in Malaysia and Indonesia, using the world’s highest-yielding feedstock – palm oil. Their governments, supported by international investment, importing nations and international institutions, have drawn up a blueprint for converting large areas of their countries into mega-plantations to grow fuel for richer nations’ cars. The ecosystems being consigned to oblivion play a crucial role in regulating the carbon cycle. If we cannot protect them, then we cannot protect the global climate and thus our own future either. However, there is no way of stopping the destruction without reducing the global demand for palm oil. Ideally, this would require a global moratorium on monoculture agrofuels and on international trade in agrofuels, although a unilateral moratorium by Europe or any other large importer would go some way to dampen prices and thus investment.



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18 P. Thoenes, FAO Commodities and Trade Division, “Biofuels and Commodity Markets: Palm Oil Focus”, 2006. <http://tinyurl.com/2kmg5>

19 UNEP, “The Last Stand of the Orangutan”, 2007. <http://tinyurl.com/2m33d7>

Snapshot of the agrofuel situation in some Asian countries

Japan

The Japanese government has no mandates for agrofuel blends in gasoline. Its focus is instead on supporting the development of an agrofuels industry through subsidies to its corporations, promotional programmes, and supply deals with major agrofuel-producing countries.

Some Japanese corporations are world leaders in the development of agrofuel technologies and a major source of foreign investment for agrofuels production. However, other corporations, notably Mitsubishi, Toyota, and steel giant NKK are funnelling their R&D in alternative fuels towards di-methyl ether, which is made from natural gas.

Some major projects

In 2005 Japanese companies agreed to invest up to US\$2 billion in the Brazilian ethanol sector. This was followed by a number of corporate deals and finally a bilateral agrofuels agreement between the two countries. The investments include a joint venture between Petrobrás and state-owned Nippon Alcohol Hanbai for the export of ethanol, a joint venture between Mitsui and Petrobrás for the production, transportation and export of ethanol to Japan, a biodiesel joint venture between Marubeni and Brazil’s largest grain and oilseeds merchant Agrenco, and another Mitsui ethanol joint venture, this time with the Brazilian sugar trader, Coimex.

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Beyond Brazil, Mitsui is building a large jatropha biodiesel refinery in South Africa and a coconut biodiesel refinery in the Philippines. Closer to home, Itochu, one of Japan's largest trading companies, plans to build cassava-based ethanol operations in Indonesia, Thailand and Vietnam.

Honda is working with the national Research Institute of Innovative Technology for the Earth on the development of cellulosic ethanol from "soft" biomass, such as rice leaves.

China

The Chinese government is the world's largest investor in the renewable energy sector. Most spending goes to hydro, solar and wind energy, with less investment in agrofuels because of concerns over impacts on domestic food supplies. Still, the government has set ambitious long-term targets for the use of biofuels and has already mandated a 10% blend of ethanol with gasoline for certain provinces and cities.

State subsidies for agrofuels are mainly channeled to four large ethanol plants: Jilin Fuel Alcohol Company Ltd, Anhui Fengyuan Petrochemical Ltd, Henan Tianguan Group and Heilongjiang Huarun Jinyu Ltd.

Despite public concerns expressed about impacts on domestic food supplies, an estimated 800,000–900,000 tonnes of ethanol were exported from the country in 2006, mostly to the US. PetroChina's Jilin ethanol refinery, the largest in the world, exported all of its production that year, and a growing number of agrofuel operations are sprouting up all over the country with little government restriction, many of them backed by foreign investment and oriented towards exports.

To relieve tensions with food supplies, the government is encouraging the use of imported feedstocks of crops like cassava, and is helping its major companies to secure supply agreements in countries such as Nigeria, Indonesia, Malaysia and the Philippines.

Some major projects

China National Cereals, Oils & Foodstuffs (COFCO) is involved in three of China's four major state-subsidised agrofuel refineries. It owns the Heilongjiang ethanol refinery and has a 20 per cent stakes in the Jilin refinery, owned by PetroChina, and the Anhui refinery. It is also building a cassava-based ethanol factory in Guangxi and two maize- and sweet-potato-based ethanol plants in Hebei and Liaoning.

China National Offshore Oil Corp is developing a biodiesel refinery and jatropha plantations covering 33,000 hectares in Sichuan. Outside China, it has a US\$5.5-billion joint venture project for palm-oil biodiesel and sugar-cane or cassava ethanol in Indonesia, and a Malaysian-based joint venture with Bio Sweet (Malaysia) to build a 1.5-million-tonne-per-year palm-oil biodiesel refinery on China's Hainan Island.

South Korea

In 2006 the government removed tax on biodiesel and mandated that domestic diesel should contain 0.5% biodiesel. However, as gasoline is the fuel most commonly used for transportation in the country, this has had a limited impact. Given that South Korea is a major producer of MTBE, which ethanol commonly replaces, the government has shown little interest in promoting ethanol as an agrofuel. Most investment by South Korean companies in agrofuels is targeted at supply deals outside of the country.

Some major projects

Ingen Company plans to build an ethanol plant in Indonesia's Lampung province, that will be supplied by cassava from a 200,000-hectare plantation. In this same part of Indonesia, Samsung plans to invest US\$1 billion in agrofuel projects through a joint venture with palm-oil producer Mapoli Raya and chemical manufacturer Cho Yang Fine Chemical, which will establish an ethanol refinery and large-scale cassava plantations. Samsung also plans to set up a 200,000-tonnes per year jatropha biodiesel plant in the Philippines with the Philippine National Oil Co.

Philippines

The Biofuels Act of 2005 mandates an ethanol blend of 5% in gasoline with an option to increase to 10% after the first two years, and a 1% blend of coconut-based biodiesel with a similar option to increase to 2%. It also provides the agrofuel industry with a range of tax and financial incentives and funding programmes.



Some major projects

State-owned Philippine National Oil Co has a number of joint-venture projects under way with foreign companies, such as Sumitomo and Samsung of Japan. Recently it signed a US\$1-billion biofuel deal with Biogreen Energy (Malaysia) for an agrofuel refinery and 1 million hectare jatropha plantation, as well as a US\$1.3-billion deal with NRG Chemical Engineering Pte (UK), for the construction of a biodiesel refinery and two ethanol distilleries, and a US\$600-million investment in jatropha plantations, which will cover over 1 million hectares, mainly in Palawan and Mindanao.

Saudi Aramco's subsidiary in the Philippines, Petron, the country's largest oil refiner, has an exclusive ethanol supply agreement with San Carlos Bioenergy, a joint venture between UK-based Bronzeoak and Zabaleta & Co, which is controlled by the president of the Philippines Sugar Millers' Association.

In January 2007, the Philippines government signed several agrofuel deals with Chinese corporations, including a US\$3.83-billion deal with the Fuhua Group to set aside over 1 million hectares of lands for the production of ethanol feedstocks for export to China.

Thailand

In 2003 the government mandated a 5% blend in five states and fixed the price of ethanol below that of gasoline. A nationwide mandate for a biodiesel blend of 2% is to come into effect in 2008. National ethanol production uses sugar cane and cassava, while biodiesel largely uses palm oil. Thai ethanol companies complain that the profit margin is tight, with low ethanol prices and high feedstock prices.

Some major projects

Thailand and Brazil have agreed on an ethanol technology transfer deal that involves the import of 300,000 litres of Brazilian ethanol

Khon Kaen Alcohol, Thailand's only publicly traded sugar company and one of its top ethanol producers, recently expanded into Laos, where wages are only a quarter of the level in Thailand, through a joint-venture sugar plantation and ethanol refinery that will export to Thailand.

State-owned gas company PTT is the largest biodiesel producer in the country. It plans to expand its capacity to 1.2 million litres per day through three joint ventures with local palm-oil companies, including a joint venture with agribusiness giant Charoen Pokphand to open new palm-oil lands in the south of the country and to develop a "downstream to upstream" fully integrated biodiesel project, from the planting of seed to the final sales of agrofuels.

India

India is Asia's second-largest producer of ethanol. In January 2003, the Ethanol Blending Programme mandated the blending of 5% ethanol in petrol. With limitations to the expansion of sugar-cane production in India, the mandate encouraged Indian sugar companies to expand into Brazil. India has become the world's largest importer of Brazilian ethanol.

Most of the auto fuel consumed in India is diesel. The National Mission on Biodiesel has set the ambitious goal of a 20 per cent biodiesel blend by 2013. The government is looking to jatropha as the main feedstock, with a goal of bringing into production by 2012 13.5 million of the 39 million hectares deemed available for jatropha production in the country.

Some major projects

Reliance Industries, India's largest private sector company, is planning to build a large ethanol refinery in Brazil. It also has a US\$500-million jatropha refinery under construction in Andhra Pradesh.

In 2006, both Bajaj Hindusthan, India's largest sugar and ethanol manufacturing company, and Indian oil major Bharat Petroleum announced their plans for multi-million dollar acquisitions and expansions into Brazil's sugar and ethanol sector.

