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Biofuels: The Five Myths of the Agro-fuels Transition

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Biofuels. The term invokes a life-giving image of renewability and abundance—a clean, green, sustainable assurance in technology and the power of progress. This image allows industry, politicians, the World Bank, the United Nations, and even the Intergovernmental Panel on Climate Change to present fuels made from corn, sugarcane, soy and other crops as the next step in a smooth transition from peak oil to a yet-to-be-defined renewable fuel economy. Drawing its power from a cluster of simple cornucopian myths, "biofuels" directs our attention away from the powerful economic interests that benefit from this transition. It avoids discussion of the growing North-South food and energy imbalance. More fundamentally, it obscures the political-economic relationships between land, people, resources and food. By showing us only one side, "biofuels" fails to help us understand the profound consequences of the industrial transformation of our food and fuel systems—*The Agro-fuels Transition*.

The Agro-fuels Boom

Industrialized countries unleashed an "agro-fuels boom" by mandating ambitious renewable fuel targets. Renewable fuels are scheduled to provide 5.75% of Europe's transport fuel by 2010, and 10 percent by 2020. The United States aims at 35 billion gallons a year. These targets far exceed the agricultural capacities of the industrial North. Europe would need to plant 70% of its farmland to fuel. The U.S.'s entire corn and soy harvest would need to be processed as ethanol and bio-diesel. Converting the bulk of their arable land to fuel crops would wreak havoc with the North's food systems. Therefore, OECD countries are looking to the Global South to meet their fuel demands. Southern governments appear eager to oblige. Indonesia and Malaysia are rapidly expanding oil-palm plantations in an effort to supply up to 20 percent of the EU bio-diesel market. In Brazil—where fuel crop acreage already occupies a land area the size of Netherlands, Belgium, Luxembourg and Great Britain combined—the government is planning a five-fold increase in sugar cane acreage. Their goal is to replace 10 percent of the world's gasoline by 2025.

The rapid capitalization and concentration of power within the agro-fuels industry is breathtaking. Over the last three years venture capital investment in agro-fuels has increased eightfold. Private investment is swamping public research institutions, as evidenced by BP's recent award of half a billion dollars to the University of California. Behind the scenes—and under the noses of most national anti-trust laws—giant oil, grain, auto and genetic engineering corporations are forming powerful partnerships: ADM and Monsanto, Chevron and Volkswagen; BP, DuPont, and Toyota. These corporations are consolidating the research, production, processing, and distribution chains of our food and fuel systems under one colossal, industrial roof.

Agro-fuel champions assure us that because fuel crops are renewable, they are environmentally–friendly, can reduce global warming, and will foster rural development. But the tremendous market power of agro-fuel corporations, coupled with the poor political will on the part of governments to regulate their activities, leads us to doubt these happy scenarios. Before jumping on the bandwagon, the mythic baggage of the agro-fuels transition needs to be publicly unpacked:

Myth #1: Agro-fuels are clean and green

Because photosynthesis from fuel crops removes green house gases from atmosphere and can reduce fossil fuel consumption, we are told fuel crops are green. But when the full "life cycle" of agro-fuels is considered—from land clearing to automotive consumption—the moderate emission savings are undone by far greater emissions from deforestation, burning, peat drainage, cultivation, and soil carbon losses. Every ton of palm oil produced results in 33 tons of carbon dioxide emissions—10 times more than petroleum.[1] Tropical forests cleared for sugar cane ethanol emit 50 percent more greenhouse gasses than the production and use of the same amount of gasoline[2] Commenting on the global carbon balance, Doug Parr, chief UK scientist at Greenpeace states flatly, "If even five percent of biofuels are sourced from wiping out existing ancient forests, you've lost *all* your carbon gain."

There are other environmental problems as well. Industrial agro-fuels require large applications of petroleum-based fertilizers, whose global use—now at 45 million tons/year—has more than doubled the biologically available nitrogen in the world, contributing heavily to the emission of nitrous oxide, a greenhouse gas 300 times more potent than CO^2. In the tropics—where most of the world's agro-fuels will soon be grown—chemical fertilizer has 10-100 times the impact on global warming compared to temperate soil applications.[3] To produce a liter of ethanol takes three to five liters of irrigation water and produces up to 13 liters of waste water. It takes the energy equivalent of 113 liters of natural gas to treat this waste, increasing the likelihood that it will simply be released into the environment to pollute streams, rivers and groundwater[4] Intensive cultivation of fuel crops also leads to high rates of erosion, particularly in soy production—from 6.5 tons/hectare in the U.S. to up to 12 tons/hectare in Brazil and Argentina.

Myth #2: Agro-fuels will not result in deforestation

Proponents of agro-fuels argue that fuel crops planted on ecologically degraded lands will improve rather than destroy the environment. Perhaps the government of Brazil had this in mind when it re-classified some 200 million hectares of dry-tropical forests, grassland, and marshes as "degraded" and apt for cultivation[5] In reality, these are the bio-diverse ecosystems of the *Mata Atlantica* the *Cerrado* and the *Pantanal*, occupied by indigenous people, subsistence farmers, and extensive cattle ranches. The introduction of agro-fuel plantations will simply push these communities to the "agricultural frontier" of the Amazon where the devastating patterns of deforestation are all too well-known. Soybeans supply 40 percent of Brazil's biodiesel. NASA has positively correlated their market price with the destruction of the Amazon rainforest—currently at nearly 325,000 hectares a year. Called "The Diesel of Deforestation," palm oil plantations for bio-diesel are the primary cause of

forest loss in Indonesia, a country with one of the highest deforestation rates in the world. By 2020, Indonesia's oil-palm plantations will triple in size to 16.5 million hectares—an area the size of England and Wales combined—resulting in a loss of 98% of forest cover.[6] Neighboring Malaysia, the world's largest producer of palm oil, has already lost 87% of its tropical forests and continues deforesting at a rate of seven percent a year.

Myth #3; Agro-fuels will bring rural development

In the tropics, 100 hectares dedicated to family farming generates thirty-five jobs. Oil palm and sugar cane provide 10 jobs, eucalyptus two, and soybeans a scant half-job per 100 hectares, all poorly paid. Until recently, agro-fuels supplied primarily local and sub-regional markets. Even in the U.S., most ethanol plants were relatively small, and farmer-owned. With the agro-fuels boom big industry is quickly moving in, centralizing operations and creating gargantuan economies of scale. Big Oil, Big Grain, and Big Genetic engineering are rapidly consolidating control over the entire agro-fuel value chain. The market power of these corporations is staggering: Cargill and ADM control 65 percent of the global grain trade, Monsanto and Syngenta a quarter of the $60 billion gene-tech industry. This market power allows these companies to extract profits from the most lucrative and low-risk segments of the value chain, e.g., inputs, processing and distribution. Agro-fuels producers will be increasingly dependent on a tightly-organized cabal of companies for their seed, inputs, services, processing and sale. They are not likely to receive many benefits.[7] More likely, smallholders will be forced out of the market and off the land. Hundreds of thousands have already been displaced by the soybean plantations in the "Republic of Soy" a 50+ million hectare area covering southern Brazil, northern Argentina, Paraguay, and eastern Bolivia.[8]

Myth #4: Agro-fuels will not cause hunger

Hunger, said Amartya Sen, results not from scarcity, but poverty. According to the FAO, there is enough food in the world to supply everyone with a daily 3,200-calorie diet of fresh fruit, nuts, vegetables, dairy and meat. Nonetheless, because they are poor, 824 million people continue to go hungry. In 2000, world leaders promised to halve the proportion of hungry people living in extreme poverty by 2015. Little progress has been made. The world's poorest people already spend 50-80% of their total household income on food. They suffer when high fuel prices push up food prices. Now, because food and fuel crops are competing over land and resources, high food prices may actually push up fuel prices. Both increase the prices of land and water. This perverse, inflationary spiral puts food and productive resources out of reach for the poor. The International Food Policy Research Institute has estimated that the price of basic food staples will increase 20-33 percent by the year 2010 and 26-135 percent by the year 2020. Caloric consumption typically declines as price rises by a ratio of 1:2. With every 1 percent rise in the cost of food, 16 million people are made food insecure. If current trends continue, some 1.2 billion people could be chronically hungry by 2025—600 million more than previously predicted.[9] World food aid will not likely come to the rescue because our surpluses will go to our gas tanks. Perversely, food aid only increases when food prices are low, not high. Instead of converting land to fuel production, what are urgently needed are massive transfers of food-producing resources to the rural poor.

Myth #5: Better "second-generation" agro-fuels are just around the corner

Proponents of agro-fuels like to reassure "food versus fuel" skeptics by asserting that present agro-fuels made from food crops will soon be replaced with environmentally-friendly crops like fast-growing trees and switchgrass. This myth, wryly referred to as the "bait and switch-grass" shell game, helps make first generation agro-fuels socially acceptable.

The agro-fuel transition transforms land use on massive scales, pitting food production against fuel production for land, water and resources. The issue of which crops are converted to fuel is irrelevant. Wild plants cultivated as fuel crops won't have a smaller "environmental footprint" because commercialization will transform their ecology. They will rapidly migrate from hedgerows and woodlots onto arable lands to be intensively cultivated like any other industrial crop—with all the associated environmental externalities.

By genetically engineering plants with less lignin and cellulose, the industry aims to produce cellulosic agro-fuel crops that break down easily to liberate sugars, especially fast-growing trees. Trees are perennial and spread pollen father than food crops. Cellulosic candidates miscanthus, switch grass, and canary grass, are invasive species. Given the demonstrated promiscuity of genetically-engineered crops, we can expect massive genetic contamination. Monsanto and Syngenta will be quite pleased. Agro-fuels will serve as their genetic Trojan horse, allowing them to fully colonize both our fuel and food systems.

Any technology with potential to avoid the worst impacts of global warming must be commercially viable on a global scale within the next 5-8 years. This is highly unlikely with cellulosic ethanol, a product that has thus far demonstrated no carbon savings. Making it a green, viable product is not simply matter of scaling up existing technology, but of major breakthroughs in plant physiology that permit the economically efficient breakdown of cellulose, hemi-cellulose, and lignin. The agro-fuel industry is either betting on miracles or counting on taxpayer bail-outs. Faith in science is not science. Selective faith in second-generation fuel—rather than working to improve existing solar, wind, or conservation technologies—is bias in favor of the highest bidder.

The Twin is Dead, Long live the Twin

The International Energy Agency estimates that over the next 23 years, the world could produce as much as 147 million tons of agro-fuel. This will be accompanied by a lot of carbon, nitrous oxide, erosion, and over 2 billion tons of waste water. Remarkably, this fuel will barely offset the *yearly increase* in global oil demand, now standing at 136 million tons a year—never mind offsetting any of the existing demand. Is this worth it?

The agro-fuel transition closes a 200-year chapter in the relation between agriculture and industry that began with the Industrial Revolution. Then, the invention of the steam engine promised an end to drudgery. However, industry's take-off lagged until governments privatized common lands, driving the poorest peasants out of agriculture and into urban factories. Peasant agriculture effectively subsidized industry with both cheap food and cheap labor. Over the next 100 years, as industry grew, so did the urban percentage of the world's population: from 3% to 13%. Cheap oil and petroleum-based fertilizers opened up agriculture itself to industrial capital. Mechanization intensified production, keeping food prices low and industry booming. The next hundred years saw a three-fold global shift to urban living. Today, the world has as many people living in cities as in the countryside. [10]
The massive transfer of wealth from agriculture to industry, the industrialization of agriculture, and the rural-urban shift are all part of the "Agrarian Transition," the lesser-known twin of the Industrial Revolution. The Agrarian/Industrial twins transformed most of

the world's fuel and food systems and established non-renewable petroleum as the foundation of today's multi-trillion dollar agri-foods complex.

The pillars of the agri-foods industry are the great grain corporations, e.g., ADM, Cargill and Bunge. They are surrounded by an equally formidable phalanx of food processors, distributors, and supermarket chains on one hand, and agro-chemical, seed, and machinery companies on the other. Together, these industries consume four of every five food dollars. For some time, the production side of the agri-foods complex has suffered from agricultural "involution" in which increasing rates of investment (chemical inputs, genetic engineering, and machinery) have not increased the rates of agricultural productivity—the agri-foods complex is paying more and reaping less.

Agro-fuels are the perfect answer to involution because they're subsidized, grow as oil shrinks, and facilitate the concentration of market power in the hands of the most powerful players in the food and fuel industries. Like the original Agrarian Transition, the present Agro-fuels Transition will "enclose the commons" by industrializing the remaining forests and prairies of the world. It will drive the planet's remaining smallholders, family farmers, and indigenous peoples to the cities. It will funnel rural resources to urban centers in the form of fuel, and will generate massive amounts of industrial wealth.

Unfortunately, the agro-fuels transition suffers from a congenital flaw: its fraternal twin is dead. There is no new Industrial Revolution. No expanding industrial sector waits to receive displaced indigenous communities, smallholders and rural workers. There are no production breakthroughs poised to flood the world with cheap food. This time, fuel will not subsidize agriculture with cheap energy. On the contrary, fuel will compete with food for land, water and resources. Agro-fuels collapse the industrial link between food and fuel. Taken to its extreme, agro-fuel will be used to grow agro-fuel—a thermodynamically pathetic proposition. The inherent entropy of industrial agriculture was invisible as long as oil was abundant. Now, food and fuel systems must shift from a savings to a checking account. Agro-fuels lead us to overdraw. "Renewable" does not mean "limitless." Even if crops can be replanted, land, water, and nutrients are limiting. Pretending otherwise serves the interests of those monopolizing those resources.
Agro-fuel's appeal lies with its potential to *prolong* the oil economy. With an estimated one trillion barrels of oil reserves left on the planet, $100-a-barrel oil is not far off.[11] The higher the oil prices, the more ethanol costs can rise while remaining competitive. Herein lays the contradiction for second generation agro-fuels: as oil becomes more expensive, first generation agro-fuels become more lucrative, discouraging the development of second-generation fuels. If oil reaches $80 per barrel, ethanol producers could afford to pay over $5 per bushel (~127 kg.) for corn, making it competitive with sugar cane as well. The planet's energy crisis is potentially an $80—100 trillion dollar bonanza for food and fuel corporations. No wonder we are invited to consume our way out of over-consumption.

Limits—not incentives—must be placed on the agro-fuels industry. It is unconscionable for the North to shift the burden of over-consumption to the Global South simply because the tropics have more sunlight, rain and arable land. If agro-fuels are to be forest and food friendly, clearly the grain, cane, and oil-palm industries need to be regulated, and not in piecemeal fashion. Strong, enforceable standards based on limiting land planted to agro-fuels are urgently needed, as are anti-trust laws powerful enough to prevent the corporate concentration of market power in the industry. Sustainable benefits to the countryside will only accrue if agro-fuels are a complement to territorial plans for sustainable rural development, not the centerpiece.

Building Food and Fuel Sovereignty

The Agro-fuels Transition is not inevitable. There is no reason to sacrifice the possibility of sustainable, equitable food and fuel systems to an industrial strategy that compromises both. Many successful, locally-focused, energy-efficient and people-centered alternatives are presently producing food and fuel in ways that do not threaten food systems, the environment, or livelihoods. *The question is not whether ethanol and bio-diesel per-se have a place in our future, but whether or not we allow a handful of global corporations to determine our future by dragging us down the dead end of the agro-fuels transition.* To avoid this trap we have to abandon the cornucopian myths left over from the age of abundant oil. We must dare to envision a different, steady-state agrarian transition built on re-distributive land reform that re-populates and stabilizes the world's struggling rural communities. We need to rebuild and strengthen our local food systems, and ensure conditions for the local re-investment of rural wealth. Putting people and environment—instead of corporate mega-profits—at the center of rural development requires *food sovereignty*: the right of people to determine their own food systems.

In both the Industrial North and the Global South, hundreds of thousands of producers and consumers are actively organizing for their right to healthy and culturally appropriate food produced through ecologically sound and sustainable methods. They are also re-building local food systems architecture to ensure that most of the wealth and benefits of food systems accrue locally—not in the distant corporate coffers of the agri-foods giants. They are holding agri-foods corporations accountable for the externalities that their industry imposes on taxpayers in the form of hunger, environmental destruction and poor health from cheap, processed foods. Social movements for land reform, indigenous rights, farmer-to-farmer sustainable agriculture, ethical trade, farmers' markets, community-supported agriculture, inner-city gardens and neighborhood-food systems development, are a few examples of the widespread, multi-faceted efforts for food sovereignty. Organizations like international *Via Campesina*, Brazil's landless movement (MST), the Federation of Southern Cooperatives of African-American Farmers, and the Community Food Security Coalition, are transforming the social will from these rural and urban movements into *political will*—the formula for social change.

Food Sovereignty movements are already squaring off with the agro-fuels boom. When U.S. president George Bush arrived in Brazil to establish an ethanol partnership with Lula, 700 women from Via Campesina greeted him by occupying Cargill's sugar mill in Sao Paulo in protest. But derailing the agro-fuels juggernaut entails changing the Agro-fuels Transition from an agrarian transition that favors industry to one that actually favors rural communities—a transition that does not drain wealth from the countryside, but that puts resources in the hands of rural peoples. This is a far-reaching project. A good nest step would be to launch a pro-active, global moratorium on the expansion of agro-fuels. Time and public debate is needed to assess the potential impacts of agro-fuels, and to develop the regulatory structures, programs, and incentives for conservation and food and fuel development alternatives. We need the time to forge a better transition—an agrarian transition to food and fuel sovereignty.

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NOTES

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