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Are Agrofuels Alternatives to Oil?

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President George W. Bush's 2007 State of the Union address calls for reducing US gasoline consumption by 20% over ten years, replacing it with 35 billion gallons of renewable fuels.

Bush's announcement has sparked a vigorous debate on issues such as the advisability of dedicating land to crops for fuel instead of food and the efficiency of producing ethanol from corn. This briefing paper addresses these and other issues less often discussed in the mainstream media: Are Canadian policies on agrofuels any different? What are the likely consequences of the production of agrofuels for peoples in the Global South? Are there not better alternatives?

We conclude that the key issue is the scale of production. Large-scale agrofuel production for export poses serious threats around land use and exploitation in the Global South. The best option remains energy conservation while promoting smaller-scale, community-based alternatives.

In 2005 the US dedicated 1.5 billion bushels of corn out of the 11 billion it produced to ethanol fuel. Demand for corn for ethanol has already pushed corn futures prices to nearly a ten year high at US\$4 a bushel. This demand will grow exponentially as there are 79 new ethanol plants under construction and another 200 in various stages of planning in addition to the 116 plants now operating in the US.¹

But there are clear limits on how much corn ethanol can be produced in the USA. Two researchers from the Polytechnic University of New York say, "The entire U.S. corn crop would supply only 3.7% of our auto and truck transport demands. Using the entire 300 million acres of U.S. cropland for corn-based ethanol production would meet about 15% of the demand."² Hence, agri-

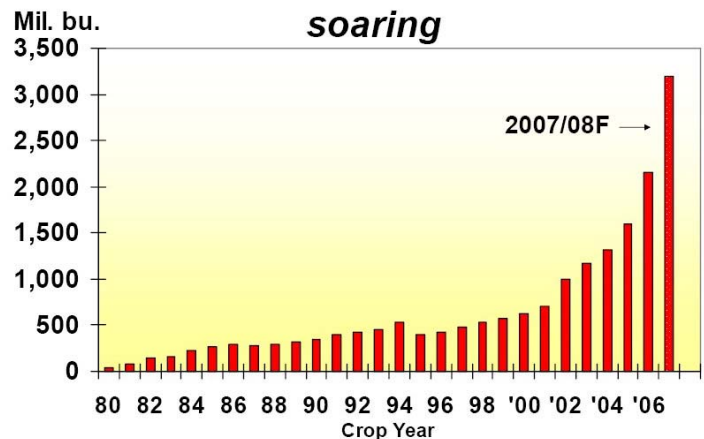
business interests are actively seeking to import agrofuels from the Global South.

Food Versus Fuel

The agrofuel-induced squeeze on corn supplies is already causing hunger in Mexico where corn imports have more than doubled since the signing of the North American Free Trade Agreement. Huge agribusiness corporations, especially Maseca and Cargill, dominate the Mexican corn flour market. These imports have undercut the market for 15 million poor Mexican campesinos who live by cultivating corn.

The price of tortillas has tripled or even quadrupled in some parts of Mexico since last summer as the price of white corn used to make Mexico's staple food is in-

Corn Used in Ethanol... soaring



Source: Collins, Keith. 2007. *Prospects for the Farm Economy*. Washington: US Department of Agriculture.

dexed to the international price of yellow corn used for animal feed and ethanol production. The consequence is that a Mexican family trying to subsist on a minimum wage has to devote a third of its income just to buy tortillas.³

Lester Brown, an economist at the Earth Policy Institute in Washington, points out that the same amount of corn needed to fill a 25-gallon fuel tank with ethanol just once would feed a Mexican for a year.⁴

In addition to the direct costs of setting aside vast amounts of land and water for energy crops, large-scale corn mono-cropping for fuel also increases the long-distance transportation of substitute foods which already travel an average of 1,800 miles per food item consumed in the US.⁵

Why is Corn the Crop of Choice?

Archer Daniels Midland (ADM), a giant grain-trading firm, spent nearly three decades lobbying the US government to promote adding ethanol blends to gasoline. This lobbying resulted in mammoth federal subsidies amounting to some US\$2 billion a year with ADM by far the biggest beneficiary. ADM's rival, Cargill, has in the past expressed concern over the danger that ethanol would bid up the price of corn so high that it would threaten its interests in processed food and livestock. But now "even Cargill is hedging its bets. It recently announced plans to nearly double its American ethanol capacity to 220 million gallons a year."⁶

The 51-cent a gallon tax credit offered by the US government goes primarily to ethanol producers, not to farmers. An examination of the combined effect of federal and state subsidies in the US shows that from a total subsidy of 79 cents a gallon only 2 cents goes to the farmer. Without some US\$3 billion a year in total federal and state subsidies ethanol production would be uneconomical in the US.

Canadian Policies

Canadian federal and provincial governments have already made significant commitments to agrofuels. The federal government's Renewable Fuels Strategy requires an average of 5% renewable fuel content in gasoline by 2010 and a further 2% in diesel fuel and heating oil by 2012.⁷

Ontario requires gasoline retailers to sell blends containing 5% renewable fuels as of January 1, 2007 and is considering a 10% requirement for 2011. Saskatchewan will force all gasoline retailers to have a 7.5% renewable fuel blend in 2007 and Manitoba will require 85% of gas sold to have a 10% blend.⁸

Currently, almost all the agrofuels produced in Canada are distilled from corn. The Suncor plant near Sarnia, Ontario is the largest facility with capacity to

produce 200 million litres of ethanol a year. Ontario's current goal will require about 750 million litres a year.

The Suncor plant is highly subsidized. The federal government paid \$22 million of its \$120 million cost and Ontario offered \$36 million in funding. The corn it uses will amount to about 10% of Ontario production with more trucked in from Michigan. Remnants left after distillation are sold as animal feed.

In December of 2006, the federal government announced a Capital Formation Assistance Program worth \$200 million designed to encourage agricultural producers to produce renewable fuels through loans of up to \$25 million per project.⁹

Is Corn Ethanol Clean or Efficient?

Critics of the corn ethanol industry question the wisdom of the current path for several reasons. While burning ethanol produces about 12% to 13% less greenhouse gases than petroleum, it is not a "clean" fuel since it also emits carcinogens and increases atmospheric ozone.¹⁰

A hotly contested issue is whether it takes more energy to produce a litre of ethanol than is contained in the final product. On May 24, 2006 two Toronto newspapers reported diametrically opposed findings. The *Toronto Star* cited a study that concluded that "a gallon of ethanol takes about 98,000 BTUs to produce but contains only 76,000 BTUs of energy, a ratio of 1.3 units of input to one unit of output."¹¹ On the same day the *Globe and Mail* cited a different study that reverses the ratio concluding that one unit of energy input produces 1.3 units of output.¹²

What lies behind these divergent views are the assumptions made as to which inputs will be included in the calculations. For example, including the energy used in building processing plants and farm machinery leads to a negative output to input ratio. In an attempt to resolve the controversy researchers at the University of California compared six different studies of the energy balance for corn ethanol and found a positive balance of between 1.13 to 1.34 units of energy output per unit of energy used.¹³

Brazil Pioneered Ethanol from Sugarcane

Brazil was the largest producer of ethanol as a motor fuel up until 2006 when it was overtaken by the USA. Together the two countries make 72% of world supply. In Brazil nearly 3 million autos run on ethanol distilled from sugarcane and another 16 million vehicles burn gasoline-ethanol blends. Ethanol accounts for one third of all fuel used in Brazilian autos.¹⁴ Ethanol yields from sugarcane are nearly eight times as high as what can be produced from corn.¹⁵

The US is negotiating a technology sharing agreement with Brazil to encourage ethanol use throughout

Latin America and the Caribbean. The Bush administration hopes that expanded ethanol usage will diminish the influence wielded by Venezuelan President Hugo Chavez who sells oil at a discount to several Latin American and Caribbean countries.¹⁶

Agribusiness corporations – including Cargill, Louis Dreyfus and Sempra Energy – are planning to build 77 more ethanol plants in Brazil over the next six years. However, social justice advocates in Brazil protest the displacement of peoples from their lands to make room for more cane-alcohol production. Brazil's rural poor demand land reform not jobs on sugar plantations where forced labour and child labour still occur. Indeed 16 workers died in Brazilian cane fields during the 2005 and 2006 harvests from overwork. Where the sugarcane is burned before it is harvested airborne pollution is as severe as in smog-shrouded São Paulo, resulting in a 12% increase in hospitalization of children and elderly people with respiratory illnesses.¹⁷

Monocrop cane cultivation is associated with deforestation, soil degradation, loss of biodiversity and contamination of water supplies. Fred Pearce, author of *When the Rivers Run Dry* identifies sugar as “one of the thirstiest crops in the world” as it takes 600 to 800 tonnes of water to grow one tonne of sugar cane.¹⁸



Brazilian sugar worker Photo: Fundação Jorge Duprat Figueiredo de Segurança e Medicina do Trabalho (FUNDACENTRO).

Ethanol from Cellulose

Advocates point to emerging technologies that would produce ethanol from cellulose resulting in a much better energy input/output ratio than is obtainable from corn or other grains. Indeed George Bush himself was careful to refer to wood chips, grasses and agricultural wastes and not corn in his State of the Union address.

The production of cellulosic ethanol from agricultural by-products such as straw or corn stocks or from wood residue (e.g. forest bark) promises less environmental damage than corn-ethanol. Cellulosic ethanol reduces greenhouse gas emissions by 89% as compared

with gasoline, considerably better than the 12-13% reduction that can be obtained from corn-based ethanol. Its energy balance is also superior as it yields 1.98 units of output for each unit of energy input. The US Department of Energy is counting on biotechnology to come up with higher yielding crops.

An Ottawa firm, Iogen Corporation, is experimenting with the production of cellulose ethanol from straw, corn stalks and switchgrass, a drought-resistant grass grown on the prairies. Producing ethanol from cellulose requires enzymes derived from fungi or termites to extract sugars from fibres.

However, cellulosic ethanol is not a panacea. One study concludes that even if all US farmland were converted to switchgrass, it still would not produce enough ethanol to substitute for current fossil fuel use.¹⁹

Sceptics question whether a transition from corn to cellulose will occur any time soon given the stake that huge agribusiness firms like Archer Daniels Midland now have in corn-based ethanol. ADM's profits have grown substantially due to the choice of corn as the preferred crop for ethanol production.

ADM has shied away from experimenting with ethanol production from crops that use less water and fossil-fuel based fertilizers like switchgrass.²⁰ ADM's Chief Executive Officer foresees ethanol making up 10% of US gasoline supply within a decade up from about 4% in 2006 and eventually replacing more than half the gasoline sold in the USA.

Are there Better Alternatives?

Rather than pursuing a mad race to grow more and more crops for agrofuels, energy efficiency and conservation are superior alternatives. Brazil's Landless Movement questions the whole pattern of consumption based on private autos and preserving the “American way of life.”²¹

US critics say the 7.5 billion gallon target for ethanol production in 2012 mandated by the 2005 Energy Bill could be met by an increase of just one mile per gallon in vehicle mileage efficiency, excluding SUVs and light trucks.²² Moreover, fuel conservation measures also make more economic sense. A study by the US Congressional Budget Office found that reducing gasoline consumption by 10% through an increase in fuel economy standards would cost consumers and industry about US\$3.6 billion a year. To replace the same amount of gasoline by producing more ethanol would cost over US\$10 billion in government subsidies.²³

A study by scientists at the University of Minnesota evaluated the relative merits of ethanol from corn and biodiesel from soybeans using life-cycle accounting. The study concludes that biodiesel releases fewer greenhouse gases and other pollutants than ethanol.²⁴

While biodiesel may be superior to ethanol it still is not without problems. The same study concludes that dedicating all U.S. soybean production to biodiesel would meet only 6% of diesel demand. Hence, the agro-fuel industry is also looking to the Global South for more oilseed production.

As with cane-alcohol in Brazil, peoples' movements in other parts of the Global South are opposed to the establishment of massive plantations to grow genetically-modified oilseed crops for conversion into biodiesel. Asian movements protest how corporations set large tracts of Indonesian forest on fire to clear land for palm oil plantations causing dense smoke to drift as far as Singapore and Malaysia.

In Colombia land dedicated to the mono-cultivation of African palm trees has more than doubled from 118,000 hectares in 2003 to 285,000 hectares in 2006. A leader of the National Organization of Indigenous Peoples of Colombia laments how foreign companies dupe indigenous people into signing contracts to hand over land without knowledge of the consequences. "The histories of these plantations are filled with grief, stained by the blood and tears of the black and campesino communities," affirms Censat - Agua Viva, a Non-Governmental Organization working in defence of poor peoples rights.²⁵

Conclusion

The destruction of Southern ecosystems to produce agro-fuels for Northerners' private vehicles only perpetuates colonial patterns and increases the ecological debt the over-consumers of the North owe to Southern peoples.

Is there no place then for using some agricultural residues to produce energy for local communities? The major issue is the scale of production.

Small-scale projects in local communities are worthwhile. For example, a group of farmers in Norfolk County, Ontario have organized a co-operative to turn waste sweet potatoes grown on sandy soil that formerly produced tobacco into ethanol. In addition they plan to build an anaerobic digester to turn the residual biomass from the ethanol plant into biogas through fermentation. The biogas will then be burned to produce electricity to run the ethanol plant with the surplus sold to a local utility. This type of localized project, which puts unused sandy soil back into production with minimal irrigation, has merit.²⁶

The challenge is to overcome the idea that there must one, single, universal substitute for gasoline and to prevent transnational corporations from turning large tracts of land in the Global South into agrofuel colonies.

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Canadian Ecumenical Justice Initiatives unites eleven churches and religious institutions in work for social justice in Canada and around the globe. KAIROS Policy Briefing Papers are produced with the support of a grant from the International Development Research Centre, Ottawa, Canada.

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