Food Secure Canada Briefing Note
Agrofuels

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Agrofuels – What are they and what are they used for?

Industry and government talk about first and second generation biofuels. Many people prefer the term agrofuel as a way to emphasize that these liquid fuels are produced from agricultural crops or on land that would normally be used for agriculture.

First generation agrofuels are usually produced from crops and in some cases from organic residue such as farm 'waste'. The most common agrofuels are ethanol made from sugarcane, corn or wheat which is blended with gasoline and biodiesel, which is made from soybeans, oil-palm or canola. Second generation agrofuels can be produced from plant biomass such as cellulose from trees, straw or switch grass. It is not currently economic to produce second-generation agrofuels.

Agrofuels have long been hyped as a green fuel that would reduce the greenhouse gas emissions of the transportation sector, provide a renewable energy source and rejuvenate rural economies. However, across the globe there is abundant evidence that the huge increase in agrofuel production is responsible for large-scale deforestation, the growth of massive monoculture plantations and the forced displacement of small-scale farmers from their land.

The chief justification for agrofuels is that they will contribute to solving the problem of climate change. However, evidence is mounting that from a life cycle perspective, the environmental impacts of crop-based ethanol and crop-based biodiesel far exceed those of gasoline and diesel. For example, if rainforest is burned in Indonesia to establish a plantation of African palm to produce biodiesel the total greenhouse gas emissions from this burning far outweigh the small reduction in emissions that biodiesel has over regular diesel fuel. Here in Canada, if the use of fossil fuels for fertilizers, pesticides, irrigation and processing of corn to produce ethanol is added up it is very questionable whether there is any net greenhouse gas reduction.

The United Nations Food and Agriculture Organization (UNFAO) now estimates that there are nearly a billion people on the planet who suffer from hunger, a figure that has been rising every year since the mid 1990's. Agrofuels will increasingly be competing with food for agricultural land. It is simply not possible to replace existing fossil fuel requirements with agrofuels. There is not enough land. Even replacing 5% of gasoline with agrofuel ethanol has huge implications for the world. Only 2% of global food production is currently going to agrofuels, but with mandatory targets for ethanol and biodiesel in fuel, this will increase to 12% in 20 years. A third of the dramatic increases in global food prices at the end of 2008 is attributable to the diversion of food crops to agrofuel production.[1] Filling the 25-gallon tank of an SUV with corn-based ethanol requires over 450 pounds of corn, which contain enough calories to feed one person for a year.

John Ziegler, former UN Special Rapporteur on the Right to Food, calls agrofuels a crime against humanity, and calls for all nation states to immediately establish a moratorium on all

initiatives that convert food into fuel. The Gallagher Review recently conducted by the Renewable Fuels Association in the UK calls for a slowdown in the growth of agrofuel production and the avoidance of projects that would utilize food as a feedstock for agrofuels.

Overview of Canada's agrofuel program

In Canada, the 2008 Biofuels Act obliges refiners to include 5% biofuel content in gasoline by the end of 2010 and a 2% biofuel content in diesel by 2012. This law comes with a generous public assistance program that provides subsidies of nearly 2.5 billion dollars over the next 7 year period. Of this, 1.5 billion dollars will directly benefit agrofuel producers by providing a subsidy of up to 20 cents per litre of renewable fuel produced. To meet the 5% mandate for gasoline, Canadian producers will generate 2 billion litres annually. Three quarters of this production will come from three corporations, Greenfield Ethanol, Suncor Energy and Husky Oil. Almost all of the required 2 billion litres will be derived from first generation agrofuels in the form of wheat ethanol in the prairies and corn ethanol in Ontario and Quebec. While the production of biodiesel is in its infancy, it is expected that the biodiesel required by refiners to comply with the Act will be met mostly with agrofuel produced from canola and soybeans.

Will agrofuel production benefit the environment?

Expanding genetically engineered crops such as canola and corn in Canada, and moving away from extended crop rotations in order to serve the fuel market, will lead to more monoculture in our agricultural system. Monocultures decrease genetic diversity within the crop and on the field, creating long-term vulnerability to serious disease, insect infestations; lack of diversity also diminishes agriculture's ability to adapt to climate change.

The conversion of perennial groundcovers to more energy intensive annual cropping systems will result in greater greenhouse gas emissions and change the Canadian prairie from the current status of a carbon sink to a net emitter of greenhouse gases. Keep in mind that 80% of Canada's productive agricultural land is located in the prairies.

An investigation[2] by Nobel Prize laureate Paul Crutzen on the costs and benefits of agrofuel production found that the nitrogen emitted from synthetic fertilizers to grow crops was much higher than expected. He concluded that agrofuels derived from corn and canola can contribute more to global warming than using fossil fuels.

A recent life cycle analysis[3] of 30 agrofuel feedstocks found that when soil acidification, fertilizer use, excessive water use, biodiversity loss and toxicity from pesticide use are factored in, ethanol produced from corn, rye and potatoes as well as biodiesel produced from soy and canola were more ecologically damaging than gasoline or diesel.

Will agrofuel production impact the safety of our food supply?

The profitability of agrofuel production depends heavily on low prices for the grain feedstock and natural gas required to produce the fuel, but it is also heavily influenced by the agrofuel refiner being able to sell the waste by-product created from the fermentation process. This by-product, known as distiller's grain (DG) is marketed as a feed additive for the livestock industry.

Research is now showing that cattle fed rations mixed with DG will have a higher incidence of e-coli 0157, elevated levels of phosphorus in the manure and emit greater greenhouse gases. Mycotoxins that appear in crops as a result of fungal infection can become concentrated through the ethanol fermentation process. Feeding DG contaminated with mycotoxins can cause severe health problems in livestock. This same health risk is present for humans as mycotoxins can be passed through cow's milk.

Will agrofuels production benefit Canadian farmers' income?

Recently, a report[4] by the C.D. Howe Institute, a conservative business-oriented think-tank, claims that few farmers will benefit from agrofuel production and those who do benefit will come at the expense of the majority of farmers in the country. The report concludes that large subsidies to encourage ethanol production distort agricultural markets and contribute to rising food prices in Canada and elsewhere. The Institute calls on the government of Canada to place a moratorium on any support for grain-based biofuel initiatives.

Will second generation agrofuels prove to be better?

Second-generation agrofuels, or what has been coined as the "next generation" of agrofuel production is promoted as a new green technological break-through that would produce ethanol from cellulose fibres contained in biomass materials such as straw, wood chips, trees, switch grass, algae or municipal garbage. Second-generation technologies are far from commercialization and are only possible with very large government subsidies. One major obstacle is the tremendous energy and cost required to break down the fibres into sugar. This has led researchers and industry in Canada and abroad to invest heavily in genetic engineering technologies that would help break down the biomass cost-effectively and improve the fermentation process. Genetically engineered crops such as switch grass, wheat, and poplar trees are in the early stages of testing and commercialization with the intention of using these new crops for agrofuel production. While second-generation agrofuel may not compete so directly with food it will come with the risks associated with genetically engineered trees, grasses and algae. It is claimed that second-generation agrofuels crops will not compete with food crops for available land. This may or may not be true in Canada but will certainly not be the case in the Global South.

What is the solution?

If the main justification for producing agrofuels is to conserve fossil fuels and achieve reductions in greenhouse gas emissions, there are many less costly and more effective programs that can be employed to meet these objectives. One quick example from the transportation sector: it takes 4 units of fossil fuels to produce 5 units of ethanol. Therefore, 5% ethanol content in gasoline does not mean reducing our fossil fuel consumption by 5% but rather by 1%. Moreover, ethanol contains only 70% as much energy as gasoline. At most, having 5% ethanol content in gasoline will reduce our fossil fuel consumption by only 0.7%. In comparison, by properly inflating our car tires, we can reduce our fossil fuel consumption by 4%.

Greater resources can be invested in modes of transportation that reduce our dependency on a transportation culture based on single trip vehicles utilizing fossil fuels. Resources should be directed to improving urban transit systems, transportation demand management programs, strict fuel efficiency standards, reduced highway speeds, inter-community rail service and

transition strategies for transportation intensive industries.

Industrial agriculture is a major contributor to global warming, responsible for more greenhouse gas emissions than the transportation sector. On the other hand, small scale, mixed and diversified production systems, improve soil fertility and act to sequester carbon dioxide from the atmosphere, while at the same time preserving and improving genetic biodiversity. Numerous studies have demonstrated that ecological agriculture is both productive and able to conserve natural resources while being culturally-sensitive, socially-just and economically viable. Ecological agriculture uses less non-renewable resources (chemical fertilizers require large amounts of fossil fuels to produce) and no synthetic chemicals which in turn improves water and air quality. An additional strength of these systems is that their high level of diversity significantly enhances the resiliency of farms making them more adaptive to climate change. Government and citizens should support small scale, local and sustainable agricultural systems in Canada and abroad.

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1 *Biofuels and Grain Prices: Impacts and Policy Responses* International Food Policy Research Institute available at: http://solutions.irri.org/images/publications/papers/ifpri_biofuels_grain_prices.pdf

2 "N2O release from agro-biofuel production negates global warming reduction by replacing fossil fuels", P. J. Crutzen, A. R. Mosier, K. A. Smith, and W. Winiwarter, Atmos. Chem. Phys. Discuss. 7, 11191–11205, 1 August 2007.

3 *www.biofuelwatch.org.uk/docs/**lca_assessment**s.pdf*

4 *www.**cdhowe**.org/pdf/commentary_268.pdf*