Biofuels For Transportation Sustainability

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For the past couple of years, we at the Worldwatch Institute have been examining key sustainability issues and how to deal with them. Initially, our aim was to engender interest in biofuels, to have them taken seriously. With the focus then firmly on fossil fuels, renewable forms of energy were not seen as likely to make significant contributions. But, the more we looked at them, the more we saw their potential, with the possibility of farmers being paid decent prices for new crops in new markets.

Now there's almost too much attention, with many rushing to get in on the action. We want to offer a word of caution—let's develop biofuels wisely. I will discuss key sustainability issues and provide examples of use of renewable energy in Guatemala and Honduras.

Not Necessarily Green

I stress to policymakers that biofuels are not guaranteed to be green or sustainable. Some see biofuels as a panacea that will help address everything from energy-security to poverty to climate change. But we have to be deliberate in how we develop them. Possibly the most important issue is land use, especially in terms of conversion of natural habitats and effects on climate. As an extreme example, conversion of virgin forest to row crops for bioenergy results in net increases in greenhouse gasses (GHGs), even in the long term.

Also important is feedstock choice. In our environmental analyses, we examine the entire biofuel life cycle—all of the steps that are involved in biofuel-production chains, including feedstock production, processing, distribution and storage—and compare it with the fossil-fuel life cycle. It is a mistake to examine biofuels in terms of an ideal standard.

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Worldwide, 98% of transportation relies on petroleum-based fuels and the transportation sector is responsible for about 25% of the world's greenhouse gasses. Climate change is one of the drivers pushing the biofuels boom, albeit less so in the United States than elsewhere. In the European Union for example, they've made progress with greenhouse-gas emissions with the exception of the transportation sector, which constitutes a major challenge.

Figure 1 provides a representation of ranges of CO_2-emission benefits for various feedstocks. Much more work is needed to produce reliable data on emissions from biofuels and biofuel blends, but this figure provides food for discussion. From left to right are switchgrass, poplar and willow, wastes and then sugar (with a broad range as it includes beet and cane), vegetable oils, and then starch sources, which are least beneficial.

In terms of environmental risks, expansion of cropland into sensitive areas is a source of concern, as are soil degradation and water issues. Expansion of corn planting in the Midwest may lead to increased fertilizer and pesticide runoff, exacerbating the dead zone in the Gulf of Mexico. Similar concerns relate to farming changes in the watershed serving the Chesapeake Bay. Water quantity is also a source of concern related to water needs to grow and process feedstocks.

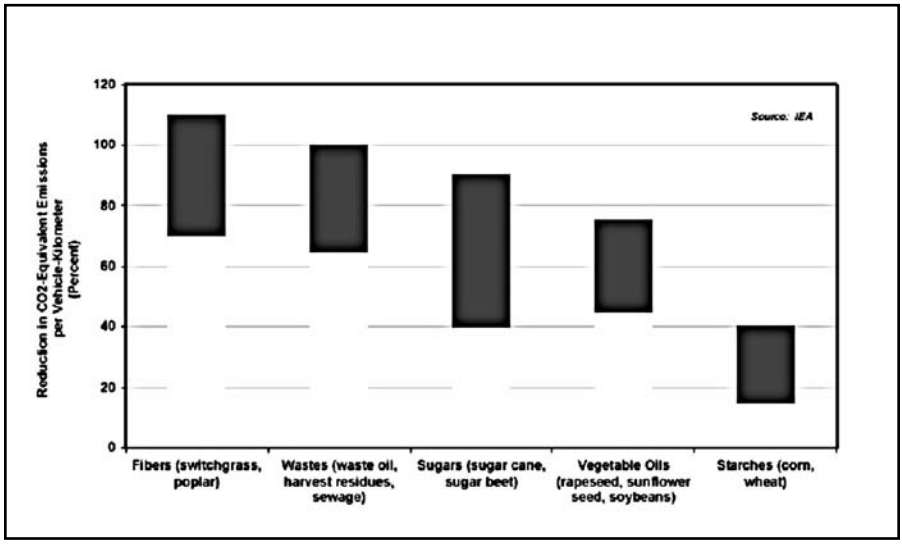

Figure 1. Feedstock impacts on vehicle CO_2 emissions.

Social Risks

We adopt a global perspective at the World Watch Institute. Violent conflicts over land, water and other resources are not pressing issues in the United States, but they did occur in Brazil when they started ramping up their ethanol industry, so these concerns are not unfounded.

It is encouraging that there is strong farmer control of the ethanol industry in South Dakota. However, trends towards ownership concentration are apparent in the United States, Brazil and in some other major producing countries. Hopefully there will be conversations on counteracting this development to retain space for family farmers and smaller producers.

The food vs. fuel issue—how increasing prices of food may affect the poor—is one of the issues I am asked about most. It's emotional and complex. The interactions between food markets and fuel markets will be increasingly problematic. No matter where you come down on this issue, people are concerned and it needs to be addressed.

In 2007, the world's population is expected to change from a majority rural population to a majority urban. However, many developing countries will remain agriculturally based. Considering that biofuels are possibly the most powerful force to affect the agricultural sector in many decades, impacts on developing countries will require close monitoring.

Ensuring Sustainability

How do we ensure that this industry will be developed responsibly and sustainably? In Germany they are tying tax incentives for biofuel development and adoption to sustainability criteria, and soon biofuels will be required to meet sustainability standards by law. Preferential federal purchasing has been used successfully. In parts of Canada, for example, the government has purchased ethanol from smaller producers in preference to purchasing from larger entities. Governments can focus their R&D on sustainable production methods.

Since 2006, there have been efforts not to put brakes on this industry, but to erect guard rails. An international consensus is building that a certification system is needed to enable consumers to buy sustainably produced fuels. Sustainability standards are being developed in the Netherlands in association with the United Kingdom. The European Union recently passed a 10% biofuels-blending mandate, but they are realizing that sustainability standards must be added.

The Sustainable Biodiesel Alliance—a new nonprofit entity—was recently formed in the United State by Willie Nelson's wife and celebrities involved in the biodiesel industry who wish to ensure that their efforts are causing no environmental harm.

There is an interesting program in Brazil in which incentives are provided to small producers; biodiesel production has become a poverty-alleviation tool. Small families are given a house and a piece of land and if they produce castor bean for a certain period of years and meet quotas, they then assume ownership of the land. And in California they have the low carbon-fuel standard.

The Roundtable on Sustainable Biofuels is an international academic and NGO-led initiative with industry partners, formed as a multi-stakeholder transparent process to develop standards.

Examples of Projects in Latin America

Jatropha is a tropical oilseed crop being examined as a feedstock for biodiesel production. It is non-edible and, as it grows well in poor soils, has potential to help with soil reclama-

tion. In Guatemala, small-holder farmers are planting jatropha cuttings on abandoned land and it is used to provide living fencing around rubber plantations.

Empacador Toledo is a large company in Guatemala City that utilizes chicken and pork fat from fast-food producers for biodiesel. They are producing 30,000 gallons/month, to run 200 of their delivery trucks. Rather than having to pay to have the waste disposed of, they are reducing their fuel costs. Aquafinca Saint Peter Fish, SA, Honduras, is the world's largest producer of tilapia. The fatty portion of the fish waste is converted into biodiesel, which supplies their considerable transportation needs.

As an independent consultant, **SUZANNE HUNT** divides her time among the US Department of Energy, the Inter-American Development Bank (IDB) and private sectors clients. She meets regularly with government, industry, and civil society leaders and with members of the media, appearing on CNN International, CNN en Español, MTV, Voice of America and public radio. She speaks frequently before diverse audiences ranging from European Parliamentarians to farm associations. She also gets out into the field as much as possible, and in the spring of 2007 drove an old truck on biodiesel and waste grease from Washington, DC, to Costa Rica—visiting producers and policymakers along the way—as part of the "Greaseball Challenge." Science magazine featured her as a "Pioneer" in August 2007.

Ms. Hunt has extensive environmental research, policy, education and planning experience. She directed the Worldwatch Institute's bioenergy program for two years where she coordinated the landmark study, *Biofuels for Transportation: Global Potential and Implications for Energy and Agriculture*. Under her leadership, a team of international experts assessed opportunities and risks of large-scale international development of biofuels. Before joining Worldwatch, she worked at Environmental Defense on social and environmental safeguard policy reform at the International Finance Institutes.

She has a BS in environmental science from Penn State and a dual master's degree in international affairs and natural resource management from American University and the UN's University for Peace in Costa Rica.