Center for BioEnergy Sustainability (CBES)
Summary of the April 2010 Forum

The Global Sustainable Bioenergy Project

Keith Kline and Martin Keller
Oak Ridge National Laboratory

The presentation was made on behalf of the organizing committee[i] of the Global Sustainable Bioenergy (GSB) Project and Dr. Lee R, Lynd. The GSB goal is to gracefully reconcile large-scale bioenergy production with other social demands. The world is at a turning point in history. In the past, the world has transitioned through agricultural and industrial revolutions. Today, a sustainability revolution is needed because society is changing from a culture with few resource constraints, low prices, and resource capital to one with multiple resource constraints, high prices, and resource income. Today's problems will not be solved incrementally. Such big systemic challenges require big systemic solutions.

Sustainable resources (sunlight, wind, hydro, geothermal, nuclear, and minerals) can follow intermediate paths to serve human needs for food, energy, and materials. Biomass is an important intermediate. It is cost-competitive, is renewable, produces few greenhouse gases, enhances energy security, and promotes rural economic development. But cellulosic biomass is recalcitrant, and biomass produces land-use concerns. The latter issue is the focus of the GSB Project.

Can we gracefully reconcile large-scale bioenergy production with feeding humanity while meeting other needs from managed lands? This process demands the most comprehensive and forward-looking scientific analysis of bioenergy potentials around the world. The analysis requires an understanding of how to effectively address food security, which is undermined primarily by poverty, local policies and limited local production (that latter, in turn, exacerbated by international food aid). These factors contribute to poorly-developed agricultural markets and infrastructure and land degradation. Sugarcane appears to be a valuable first-generation feedstock. Cellulosic biomass is a promising second-generation feedstock. Some biomass crops (e.g., corn, sugarcane) can be grown for multiple purposes (food, feed, starch, fibers, fuel…), boosting productivity per acre and decreasing susceptibility to cyclical shocks common in internationally traded commodities.

Policymakers are confused by the contradictory and polarized presentations of biofuel potential. This is an unacceptable state of affairs in light of the urgency of the challenges inherent in the sustainability revolution. A more definitive answer about sustainable productivity is needed. Many factors affect biofuel efficiency, such as land-use productivity, pasture intensification, double/triple-cropping, diet, efficient processing technology, trade/tariffs/subsidies, land tenure, and valuation for more efficient use of water and soil. The relative importance of these and other factors varies by region. The GSB Project, initiated in June 2009, hypothesizes that it is possible to gracefully reconcile large-scale bioenergy production with feeding humanity, meeting other needs from managed lands, and preserving wildlife habitat and environmental quality.

Sustainable biomass will be needed for mobility, electricity, rural development, and land management. The GSB Project wants to look at what is most desirable in a vision of the future, starting with what is biophysically possible. This project would be the most comprehensive and forward-looking analysis to date, considering not just *if* but also *how*. The focus is on scientific analysis, not advocacy. GSB involves three stages: gathering input and recruiting participants, addressing the working hypothesis, and analyzing implementation paths and recommend policies.

Some partners have been identified at the first "continental conventions" in Europe, Latin America, and Africa, where the project has attempted to bring together a local understanding of needs, aspirations, diversity, and restraints with bioenergy solutions and opportunities. Issues such as land availability, water availability/quality, and population dynamics also need to be considered in these analyses. Sustainability requires increasing productivity while decreasing inputs. The Europeans have identified 40,000,000 ha of abandoned farmland with their sophisticated models. They have a detailed vision (posted on the European

GSB web site). The participants at the African convention felt that policy-makers were out of touch with the actual production, utilization and future potential of the land as an energy resource. However, there are many social concerns in Africa, including the appearance of "land grabbing" by large foreign interests and multi-national corporations. In Latin America, Brazil is looking at the sugarcane model as a foundation from which to expand sustainable production, with an industrial plan that would displace 10% of the world's transportation fuels.

For more information see the GSB web site and links to each continental convention web site: http://engineering.dartmouth.edu/gsbproject/index.html

Presentation Slides

[i] GSB organizing committee includes: Lee Rybeck Lynd, Thayer School of Engineering, Dartmouth College and Mascoma Corp.; Carlos Enrique de Brito Cruz, FAESP, Sao Paulo, Brazil; Andre Faaij, Copernicus Institute, Utrecht University, Netherlands; Jon Foley, University of Minnesota; Jose Goldemberg, University of Sao Paulo, Brazil; Nathanael Greene, Natural Resources Defense Council; Mark Laser, Dartmouth; Reinhold Mann, Battelle Malaysia; Ramlan Aziz, Universiti Teknologi Malaysia; Patricia Osseweijer, Delft University of Technology, Netherlands; Tom L. Richard, Pennsylvania State University; John Sheehan, Institute on the Environment, University of Minnesota; August Temu, World Agro-forestry Centre; and Emile van Zy, University of Stellenbosch, South Africa