The Local Bioenergy Initiative:
Enhancing the Triple Bottom Line of Agriculture

Production of perennial grasses to be used for renewable energy is a promising new approach to improve the economic, environmental, and social results – the triple bottom line – of agriculture. The Agricultural Watershed Institute (AWI) is providing leadership to make this a reality.

In 2006-07, AWI convened a biomass "learning group" including key stakeholders and experts. With input from the learning group, AWI estimated production costs of energy grasses, identified potential local markets for renewable biomass, and analyzed environmental benefits related to production and use of energy grasses. The project report[1] presents a roadmap for the creation of a local market for perennial energy grasses.

The Local Bioenergy Initiative described in this paper is the next phase of AWI's energy grass program. AWI will work with farmers, landowners, entrepreneurs, scientists, governmental units, and nonprofit organizations to start implementing the roadmap. As the United States addresses the linked challenges of energy independence and climate change, Decatur's history of city-farm-industry cooperation for innovative watershed management offers unique opportunities for economic and environmental benefits from the production and use of perennial energy grasses.

Renewable Energy from Perennial Grasses: The perennial grasses that have received the most attention for bioenergy are switchgrass and miscanthus. **Switchgrass** is native to much of the U.S. and was a prominent species in Illinois tallgrass prairies. It was identified as having favorable characteristics for energy use in studies conducted at Oak Ridge National Laboratory starting in the 1970s. **Miscanthus** is a large perennial grass native to Asia. Some Miscanthus species are grown in gardens as an ornamental plant. *Miscanthus x giganteus,* a high-yielding sterile hybrid propagated through rhizomes, is now used for bioenergy in Europe and is being introduced in the U.S. The University of Illinois bioenergy research program focuses mainly on Miscanthus. **Multi-species polycultures of native prairie plants** can also be used for bioenergy. Prairie polycultures can yield as much or more than switchgrass and provide ecological benefits including biodiversity and wildlife habitat.

Energy grasses are viewed by scientists and policy makers as a way to provide renewable energy, reduce greenhouse gas emissions, and protect soil and water resources. The 2007 federal energy bill called for increasing annual biofuel production from 7 billion gallons in 2007 to 36 billion by 2022. Most of the increase is expected to be cellulosic ethanol made from waste wood, fast-growing trees, crop residues, or perennial energy grasses. The 2008 farm bill created a Biomass Crop Assistance Program to support projects to grow, process, and use renewable biomass.

AWI's Local Bioenergy Initiative will help to ensure that Decatur-area farmers, businesses, and communities are in the forefront of this important segment of the Green Energy future. The Initiative will promote use of energy grasses to heat buildings or generate electricity and steam. Since biomass can be used for these purposes with current technology, this approach represents the greatest opportunity for establishing a local energy grass market in the near future.

[1] *Establishing a Grass Energy Crop Market in the Decatur Area,* August 2007, available at www.agwatershed.org.

Why "local" and why Decatur? Biomass is a low density fuel so it is important to minimize transport distances. Developing markets close to where the grass is grown makes economic sense. The concept of local bioenergy also highlights use of cropping systems and management practices well suited to local conditions in order to optimize the economic and environmental benefits of growing energy grasses.

Central Illinois farmers and Decatur businesses were instrumental in introducing soybeans nearly a century ago and in launching the biofuel era with production of corn-based ethanol. It is fitting that our area is poised for leadership as the nation pursues the goal of clean, renewable energy from cellulosic biofuels. A downside of annual row crop production is that runoff contributes to sediment and nitrate problems in Lake Decatur. The city-farm partnership to address these issues has achieved national recognition. So it is also fitting that innovative projects to demonstrate the soil and water benefits of perennial energy grasses be conducted in the Lake Decatur watershed.

The Local Bioenergy Initiative includes several linked components. The project will involve collaboration between AWI and numerous public, private, and nonprofit sector partners to begin growing, using, and receiving the benefits of energy grasses. AWI and our partners will:

1. Assist local farmers and landowners that want to begin growing energy grasses. This will include workshops, field days, fact sheets, web sites and other educational activities for prospective growers. AWI plans to coordinate an energy grass education area at the 2009 Farm Progress Show. In addition to technical assistance, AWI and our partners will provide financial and in-kind support for establishing energy grasses. AWI will work with the Macon County Soil and Water Conservation District to implement the Big and Long Creek subwatershed project, which includes harvestable filter strips designed to protect Lake Decatur.

2. Develop and demonstrate landscape design concepts. Production of energy grasses involves synergies and trade-offs between multiple objectives. AWI will convene a Landscape Design Learning Group to address questions of what to grow, where and how to grow it in order to produce energy feedstock, protect water quality, and achieve other conservation objectives. AWI and our partners will develop and test planning techniques to identify optimal locations for energy grasses. We will pursue grant funding opportunities for watershed-scale R&D projects.

3. Develop markets for energy grasses and related benefits. The most likely near-term markets for fuel made from energy grasses are home or commercial heating systems and industrial or utility boilers. AWI will work with businesses, entrepreneurs, and investors to assess options and we will conduct tests and demonstration projects on the most suitable options. A related benefit of the Initiative is that it can generate economic development, such as opportunities for local companies to manufacture equipment to make and use grass fuel.

The economic viability of energy grasses depends on placing a value on environmental benefits derived from their production and use. When the U.S. adopts policies to address climate change, carbon credits are expected to increase in value and give an important boost to bioenergy systems that significantly reduce CO_2 emissions. The Initiative will include pilot tests of "green payments" for greenhouse gas reduction, water quality, and other conservation benefits.

To participate in or support the Local Bioenergy Initiative, contact Steve John, Agricultural Watershed Institute, at (217) 877-5640 or sfjohn@agwatershed.org, or visit the AWI website, www.agwatershed.org.