Biomass industry needs to prepare for water constraints

February 28 2014, by Phil Ciciora

The viability of the bioenergy crops industry could be strengthened by regulatory efforts to address nonpoint source pollution from agricultural sources. That, in turn, means that the industry should be strategic in developing metrics that measure the ability to enact positive changes in agricultural landscapes, particularly through second-generation perennial crops, according to a paper by a University of Illinois expert in bioenergy law.

Debates surrounding the sustainability of bioenergy have emerged in recent years relating to water quality and quantity, and those debates will only grow louder as big urban areas in the U.S. start running out of water and environmental groups and the Environmental Protection Agency push for more stringent policies to address nutrient pollution, said Jody Endres, a professor of bioenergy, environmental and natural resources law at Illinois.

"From a bioenergy standpoint, that's when we're going to have to figure out how we prioritize growing crops for bioenergy," said Endres, who also is an affiliate of the Energy Biosciences Institute, a collaboration involving the U. of I., the University of California at Berkeley, the Lawrence Berkeley National Laboratory and BP, an energy company.

"With regard to water shortages, agriculture might lose that battle against more powerful urban interests, although certain states – Texas, in particular – have been favorable to agricultural interests," she said. "But no matter how this plays out, we as a society are going to have to think

about how can we meet the water demands of our citizens, as well as improving the quality of the water itself, and how much of it we decide to devote to biofuels crops, particularly in areas of water stress."

According to Endres, increased regulatory pressure on agriculture's contribution to nutrient pollution is almost certain, as demonstrated by the EPA's actions in the Chesapeake Bay and in Florida.

"Pressure is also mounting from environmentalists for the EPA to take action to combat hypoxia in the Gulf of Mexico, which has already led to a loss of fishing and tourism jobs that rely on a functioning ecosystem," she said. "What all of this means is that biomass producers in the U.S. need to be ahead of the curve and put in place metrics that can demonstrate their potential to benefit water quality. These would help producers to participate in emerging ecosystem services markets such as nutrient credit trading programs like those already in place in Virginia."

As both water quality and quantity are reduced, competition for remaining useable water resources inevitably goes up among agricultural, ecological and urban uses, Endres said.

"In light of severe drought across much of the U.S., water quantity can no longer be taken for granted by agricultural producers, who may be more accustomed to abundant water supplies characteristic of rain-fed agriculture," she said. "So water use will likely be curtailed, particularly in areas already under stress from drought, and where irrigation withdrawals are taken from depleted underground aquifers. There also will be increased national pressure to do a nutrient-management strategy in the states, if not at the national level."

In the U.S., the areas of greatest concern for the biomass industry lie primarily in the Great Plains, where agriculture is more dependent on

irrigation. Complex state laws, exemplified by the tangle of laws in Texas, will complicate future disputes over water.

"U.S. law basically addresses water quantity and quality in different ways," Endres said. "At the federal level, we have the Clean Water Act that deals with quality. But then we have 50 different state rules on water quantity – the two are sometimes related to one another."

According to the paper, sustainability standards for energy biomass in Europe are driving efforts to gauge the effects of biomass practices in the U.S.

"Much of European bioenergy is going to come from the U.S. and Brazil, so they're very interested in how we handle sustainability issues," Endres said. "Europe is really a leader in thinking about bioenergy from a sustainability standpoint. They've been dealing a lot with the greenhouse gas aspect of it, but the next question, and I think the bigger and more important question, is how bioenergy and the definition of its sustainability fits with competing water uses."

Efforts to reduce the environmental footprint of biomass production, coupled with the benefits of perennial crops over annual crops, coincide with federal efforts to reduce nutrient and sediment pollution, Endres said.

"We have a lot of research collaboration with the Europeans on how we handle the greenhouse gas aspect of it, but with water, Europeans must begin to understand how 50 states, each with different laws, handle quantity issues," she said

According to Endres, the aggressive measures by the EPA to clean up nutrient-polluted waterways present valuable incentives for perennial biomass crops to play a major role in reducing pollution run-off.

"The biomass sector is still in its infancy, so we want to make sure that it can stand on its own two feet, from a financial standpoint," Endres said. "But you have to balance that with the opportunity aspect of it, especially for perennial crops, which mesh nicely with nutrient-reduction strategies. So there's real opportunity here in the U.S."

The paper was published as a chapter in the report "Bioenergy and Water" by the Joint Research Centre of the European Commission's Institute for Energy & Transport.

More information: The paper, "U.S. Federal and State Water Laws' Impact on Bioenergy Policy," is available online: bookshop.europa.eu/en/bioenerg … d-water-pbLDNA26160/

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