

Cellulosic Ethanol & Water Quality:

Opportunities for multiple revenue streams
and environmental benefits, and the
constraints to getting there

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Current constraints to cellulosic ethanol production

- Fermentation technology not competitive with grain, sugar ethanol
- Bulkier to store and handle
- Assurances of adequate supply of materials
- Different process than grain so cannot easily convert from grain to cellulosic

Specific problems with switchgrass or other perennial grasses

- Takes two years to establish
- Requires new farm equipment/infrastructure
- Requires new storage, handling and processing infrastructure
- Must grow sufficient acreage locally to meet needs the year the plant comes on line
- It doesn't look like corn

Why might switchgrass succeed?

- Lower cost to produce over time
- 20+ year perennial
- Greater net energy production
- Ligno-cellulosic co-product can be burned for heat
- Does not *directly* compete with feed
- Environmental benefits rather than consequences
- Potential for multiple revenue streams

Multiple revenue sources from switchgrass

- Topgrowth for biofuels
- Burn fermentation residue for heat/energy
- Carbon sequestration in root system
- Tradable nutrient credits (>50% reduction from row crops)
- Soil quality credits (currently in CSP)
- Improved soil productivity for the future

Why may perennial energy crops & waste based cellulosic ethanol succeed long term?

- Same as for switchgrass
 - No *direct* competition with feed stocks
 - More potential revenue streams than grain
 - Environmental benefits, not consequences
- Cellulosic technology is improving
- Availability of multiple, low cost, “opportunity” feedstocks
- White House/USDA support cellulosic ethanol(sort of)
- Cannot get to “25 by 25” without cellulosic

“I like the idea of a president being able to say, wow, the crop report is in, we’re growing more corn than ever before, which means we’re importing less oil from overseas .”

George W. Bush, February 22, 2007
(New York Times, 2/23/07)

Ethanol use for gasoline blending grows to 14.4 Billion gallons ... but domestically-grown corn is expected to be the primary source, accounting for 13.6 billion gallons of ethanol production in 2030 .”

Guy Caruso, Administrator of the U.S. DOE’s Energy Information Administration in testimony before the Senate Committee on Energy and Natural Resources, March 1, 2007

Summary and Conclusions

- Real opportunity for multiple revenue sources
- Combination of dedicated energy crops and opportunity feedstocks attractive
- Potential for environmental/WQ benefits
- Production, handling, storage and processing infrastructure not in place
- Competitive fermentation technology looks further away than was thought
- Must now supplant an established grain ethanol industry