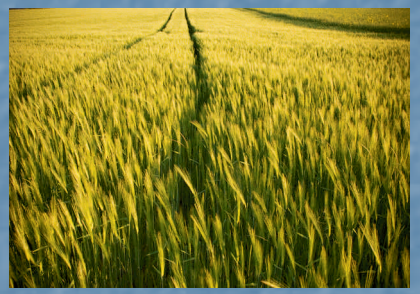
Renewable Energy and Biofuels



Environmental Symposium

August 28, 2009

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Impetus for renewable energy and biofuel technology in Florida:

- State and federal **renewable fuel standards** (RFS) – primarily for energy independence from foreign supplies
  - *Ethanol*
  - *Biodiesel*

Impetus for renewable energy and biofuel technology in Florida:

- Florida's **greenhouse gas reduction** programs
  - *Focus on electric utilities*
  - *Biomass-to-electricity can be carbon neutral*

Impetus for renewable energy and biofuel technology in Florida:

- Florida's **renewable portfolio standard** (RPS) for **electricity** production
  - *Biomass is expected to play large role in meeting RPS*
  - *Solar and wind will also play a role*

Status of Florida Programs

- State RFS is 10% ethanol by 2010
- State greenhouse gas reduction program currently undergoing rulemaking
- State RPS under consideration by Legislature (20% by 2020)

Status of Federal Programs

Federal renewable fuel standard

- **9 billion gallons** of renewable fuel produced in 2009
- Proposed increase from 10% to 15% blends
- Proposed doubling to **18 billion gallons** by 2014
- Proposed doubling again to **36 billion gallons** by 2022
- Currently 130 billion gallons of gasoline consumed annually **(goals of 7 to 28 percent)**

Status of Federal Programs

- Renewable energy and biofuel projects were part of the **stimulus package** *(tax credits, grants, loan guarantees)*
- New federal programs likely to be developed in near future
- If federal funds used, NEPA triggered

President Barack Obama's Inauguration Address to the Nation in January

For everywhere we look, there is work to be done. The state of the economy calls for action, bold and swift, and we will act — not only to create new jobs, but to lay a new foundation for growth. We will build the roads and bridges, the electric grids and digital lines that feed our commerce and bind us together . . . **We will harness the sun and the winds and the soil to fuel our cars and run our factories.** . . . All this we can do. All this we will do.

Wind Turbines

- A turbine can be 400 feet high and generate 5 MWs of electricity

Solar Photovoltaic (PV)

- Typically used on rooftops (residential and commercial)
- Can be utility-scale and tied into the grid

Solar Thermal

- Solar energy used to generate steam
- One plant could generate 100 MWs

"Biomass" Used to Generate Electricity

- Typically 50-100 MW units
- The only "baseload" renewable source of energy
- Biomass can be gasified and resulting product gas combusted like a traditional fossil fuel
- Biomass can be combusted in a boiler: *traditional, circulating fluidized bed, or bubbling fluidized bed*

Biomass Feedstocks

- Wood
- Wood waste
- Agricultural waste
- Livestock/poultry waste
- Municipal solid waste
- Landfill gas

Biomass Feedstocks

- As much as 600-800 tons per hour needed to support 50 MWs
- Energy crops could provide 10-20 tons/acre
- 20,000-30,000 acres of energy crops could be needed to support a single energy facility

Ethanol

- In Florida only cellulosic ethanol really under consideration, not corn ethanol
- Feedstocks:
  - Bagasse
  - Energy cane
  - Sweet sorghum
  - Switchgrass
  - Wood/wood waste

Biodiesel Sources

- Animal fats
- Vegetable oils
- Soy
- Rapeseed
- Jatropha
- Sunflower
- Palm oil
- Algae

Initial Siting Issues

- Usable site area needed for operations
- Distance between crops and processing facility
- Distance to nearest distribution facility
- Distance to nearest neighbors
- Land use and zoning designations
- Availability of water
- Water discharge considerations
- Air quality
- Wetlands on site

Land Use Approvals

- Comprehensive Plan Amendment
  - Local approval
  - Department of Community Affairs approval
- Zoning Considerations
- Special Use Permits
- Site Plan Approvals

Biomass Planting Permit

- Florida Department of Agriculture and Consumer Services
- Applies if $\geq$ 2 acres of non-native plants grown for fuel (not food)
- Intended to control plant species used in Florida

Environmental Permitting

- Air Quality Permit
- Consumptive Water Use Permit
- Environmental Resource Permit: *Stormwater and Wetland Impacts*
- Section 404 Corps Permit

Environmental Permitting

- NPDES Stormwater Permit
- Water Discharge Permit (e.g., NPDES)
- Solid Waste Permit

Local Government Standards

- Noise
- Odor
- Lighting
- Height restrictions

Consolidated Permitting Potential

- Solar and biomass projects ≥ 75 MWs would trigger review under the Florida Electrical Power Plant Siting Act
- Expedited, consolidated state permitting coordinated by the Office of Tourism and Economic Development potentially available if a number of new jobs are being created

Greenhouse Gas Considerations for Biofuels

A "lifecycle analysis" could be required

- *Cradle-to-grave analysis of all environmental impacts*

or

- *Impacts on greenhouse gas emissions by displacement of fossil fuels with renewable biofuels*

Greenhouse Gas Considerations for Biofuels

To qualify as a "renewable fuel," EPA recently proposed required reductions in ethanol and biodiesel lifecycle greenhouse gas emissions when compared to gasoline.

Greenhouse Gas Considerations for Biofuels

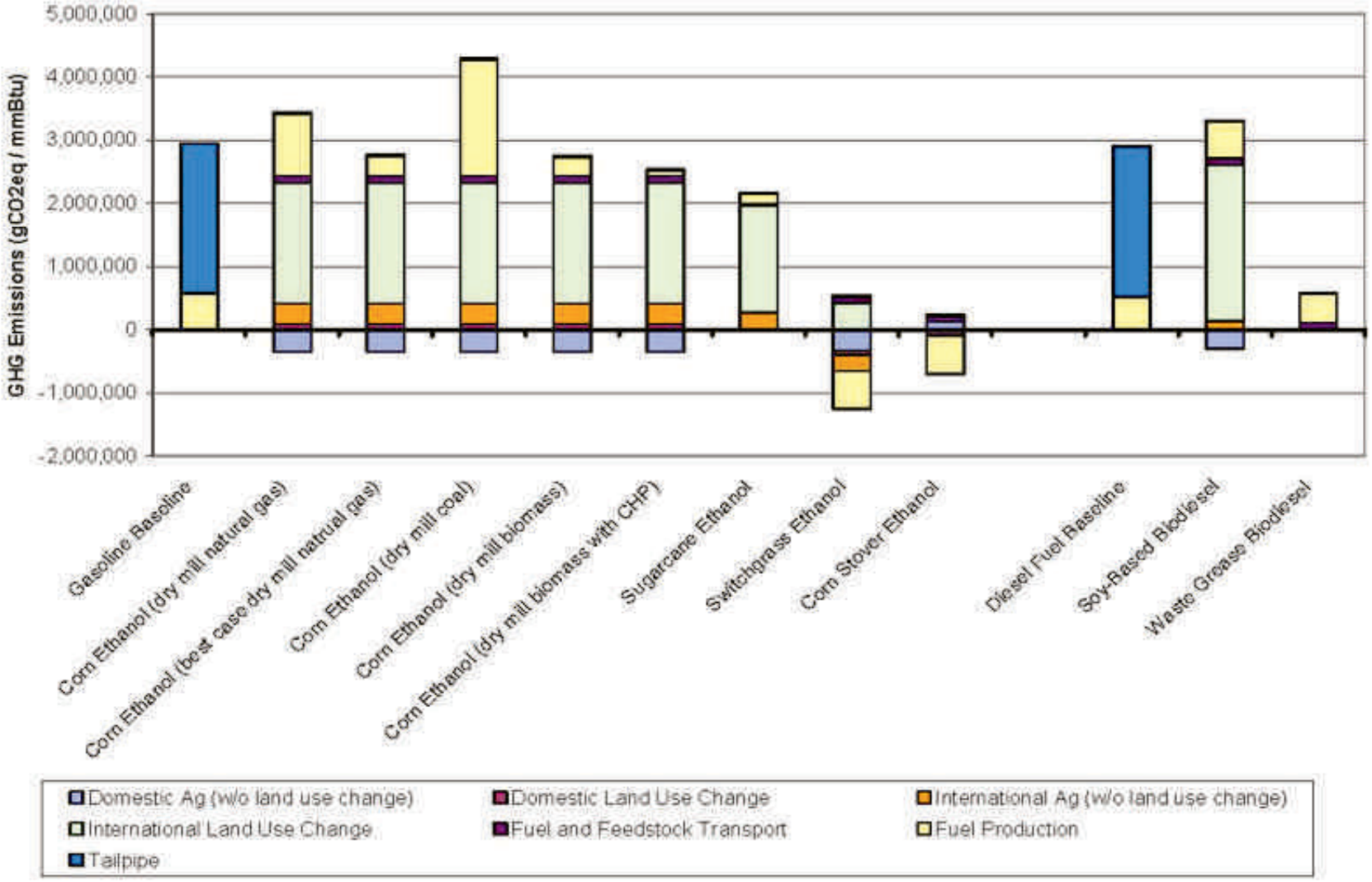
Lifecycle GHG Thresholds for Proposed Federal RFS (percent reduction from 2005 baseline)

Renewable fuel[a]	20%
Advanced biofuel	*50%
Biomass-based diesel	50%
Cellulosic biofuel	60%

[a] The 20% criterion generally applies to renewable fuel from new facilities that commenced construction after December 19, 2007.

* EPA is proposing to exercise the 10% adjustment allowance for the advanced biofuels threshold to as low as 40%

Figure 2. Net Lifecycle Greenhouse Gas Emissions By Lifecycle Component With 30 Year Time Horizon And 0% Discount Rate.



Possible Hurdles to Overcome

- NIMBYs, NOPEs, LULUs, CAVEs, BANANAs etc.
- Comprehensive Plan Amendments
- Permit/land use challenges and administrative hearings
- Federal approvals (different time clocks)
- NEPA if federal funds from stimulus package used

Wind Turbines

- Wind energy in Florida predominant along coastline
- Wind turbines could be located offshore
- Proposed large 400-foot structures along coastline have been disfavored primarily because of aesthetics (noise and avian impacts cited)
- Federal Aviation Administration (FAA) and military concerns: *impacts on flight paths and radar disturbances*

Biomass Plants

Proposed minor source air permit for a 42-MW biomass gasification project in Tallahassee, near the FSU campus, was challenged and the application subsequently withdrawn

- Alleged health concerns from particulate matter emissions (alleged AAQS not sufficiently protective)
- Alleged concerns with odor, noise, and lighting
- Environmental Justice concerns also raised
- Other projects recently proposed

Tips to overcome or at least minimize obstacles

- Early site screening and fatal flaw analysis
- Early contact with agencies
- Early identification of all potentially applicable requirements
- Public outreach campaign
- Transparency in the process
- Consistent message
- Organized team of professionals

Questions?