Climate Change Policy & Agriculture

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2009 Illinois Farm Economics Summit
The Profitability of Illinois Agriculture: Profitability at a Crossroads
Sea Ice & Temperature

September 1979

September 2007

Climate Change & Weather


For each plant variety, there is an optimal temperature for vegetative growth, with growth dropping off as temperatures increase or decrease. Similarly, there is a range of temperatures at which a plant will produce seed. Outside of this range, the plant will not reproduce. As the graphs show, corn will fail to reproduce at temperatures above 95°F and soybean above 102°F.

Potential Impact on Agriculture

- Potential benefit in near term for some grains/oilseeds due to elevated CO$_2$ levels and warmer temperatures
  - Elevated ozone levels may negate yield benefits
  - Increased risk of “extreme” events—heat, drought
  - Potential for increased pests/weeds

- Potential adverse affect to livestock management and irrigation

Source: EPA Endangerment Finding (Dec. 7, 2009)
U.S. GHG Emissions by Sector

Source: EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2007 (data rounded to total 100%).
Primary Greenhouse Gases
- Carbon Dioxide (CO₂)
- Methane (CH₄)
- Nitrous Oxide (N₂O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulfur Hexafluoride (SF₆)

1 Kg of CO₂ has a GWP of 1, with all other GHGs measured against the CO₂ baseline to create CO₂e
Methane Emissions by Source

Figure 15. U.S. Methane Emissions by Source, 1990-2008

- Energy
- Agriculture
- Waste Management
- Industrial Processes

Source: EIA estimates.

Figure 17. U.S. Methane Emissions from Agriculture by Source, 2008

- Enteric Fermentation in Domesticated Animals (148.6)
- Solid Waste of Domesticated Animals (64.5)
- Rice Cultivation (10.6)
- Crop Residue Burning (1.3)

2008 Total = 225.0

Nitrous Oxide Emissions

Figure 20. U.S. Nitrous Oxide Emissions by Source, 1990-2008

Source: EIA estimates.

Figure 21. U.S. Nitrous Oxide Emissions from Agriculture by Source, 2008

2008 Total = 217.9

Agricultural Soils 165.0
Crop Residue Burning 0.6
Solid Waste of Domesticated Animals 52.3

Source: EIA estimates.

CO$_2$ Flux (Sequestration)


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<thead>
<tr>
<th></th>
<th>1990</th>
<th>2006</th>
<th>2007</th>
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<tbody>
<tr>
<td>Estimated Sequestration (Million Metric Tons CO$_2$e)</td>
<td>96.3</td>
<td>44.5</td>
<td>45.1</td>
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<tr>
<td>Change from 1990 (Million Metric Tons CO$_2$e)</td>
<td>-51.8</td>
<td>-51.2</td>
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<tr>
<td>(Percent)</td>
<td>-53.8%</td>
<td>-53.2%</td>
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<tr>
<td>Average Annual Change from 1990 (Percent)</td>
<td>-4.7%</td>
<td>-4.4%</td>
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<tr>
<td>Change from 2006 (Million Metric Tons CO$_2$e)</td>
<td>0.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Percent)</td>
<td>1.4%</td>
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Voluntary Agricultural GHG Emission Reductions

- Trading of carbon credits created outside of a legal mandate based on contractual relationships
  - E.g., Chicago Climate Exchange (CCX)
- Total CCX Offsets (tons CO₂e)
  - Agricultural Methane: 1,406,300
  - Agric. Soil Carbon: 21,679,100
  - Forestry: 11,223,800
- Future of CCX hinges on “cap & trade” rules
Key Legal Developments

- Mandatory GHG Reporting Rule (Oct. ’09)
  - Proposed GHG permitting requirements for New Source Review (NSR) and Title V operating permits for large facilities (Oct. ’09)
  - Prevention of Significant Deterioration (PSD) program reconsideration (Oct. ’09)
  - GHG Endangerment Finding (Dec. ’09)
- H.R. 2454, American Clean Energy & Security Act (Cap & Trade bill)
- Renewable Fuel Standard (RFS2) Rules (May ’09)
**Mandatory GHG Reporting Rule**


- **Purpose**
  - Collect accurate emissions data to inform future policy

- **Timing**

- **Scope**
  - Facilities with 25,000 metric tons CO$_2$e/year
    - 85% of U.S. emissions / 10,000 facilities
    - Includes approximately 107 livestock facilities
  - Exempts all other agric. operations & food processing
Massachusetts v. EPA (2007)

• Supreme Court rules that GHGs are “air pollutants” covered by the CAA
  • EPA required to determine if GHGs from new motor vehicles contribute to air pollution, which may endanger public health or welfare (endangerment finding)
• Domino effect
  • If issue “endangerment” finding, then may regulate GHGs from new motor vehicles
  • Regulation of GHGs from new motor vehicles will trigger additional GHG regulations
Proposed GHG permits for NSR & Title V operating permits


- **Purpose:**
  - Mandate emissions control requirements / best available control technologies at large industrial facilities

- **Scope:**
  - New / modified facilities with 25,000 metric tons CO2e/year
  - EPA could later lower permit thresholds
  - No explicit agricultural exemption

- Issued in conjunction with proposal to revise PSD regulations to include GHGs (74 Fed. Reg. 51535)
Issued Dec. 7, 2009

Finding:
- Six GHGs endanger both the public health and public welfare of future generations
- New motor vehicles contribute to GHG air pollution

Rule effective 30 days after publication in Federal Register

Supports the Sept. 15, 2009 proposed rule to limit GHGs / improve fuel economy to 35.5 mpg
H.R. 2454, American Clean Energy & Security Act

- **Title I & II:** Clean Energy & Efficiency Incentives
- **Title III:** "Caps" certain GHG emissions
  - 17% reduction from 2005 levels by 2020
  - 83% reduction from 2005 levels by 2050
  - Rules and allowances set by EPA
  - Ability to "trade" emission allowances/offset credits
- **Title V:** Exempts all agricultural activities from "cap"
  - Rules for offsets set by USDA (not EPA)
    - USDA projects a net annualized annuity benefit of $22 billion to agriculture industry; 30% of benefit to Corn Belt
- **Preempt EPA Clean Air Act GHG regulations**
Energy Independence; Support Rural Economics; Reduce GHG Emissions
Concluding Thoughts

- Federal government likely to take significant steps to regulate GHG emissions in 2010
- Medium to long term potential input price increases from GHG regulation under “cap & trade” or Clean Air Act rules
- Agriculture may have significant opportunities to diversify farm income via GHG offset trading under “cap & trade” regime
- Bioenergy mandates unlikely to change and low carbon fuel requirements will support diversified agricultural operations