Update on USDA Climate Change Activities

Climate Change Program Office
USDA Office of the Chief Economist

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USDA Climate Change Program Office Projects


2. *Science-Based Methods and Technical Guidelines for Quantifying Greenhouse Gas Sources and Sinks in the Forest and Agriculture Sectors*
   - Review of Reviews (Published December 2011)
   - Report of Tools (Published February 2012)
   - Technical Guidelines and Science-Based Methods (Spring 2013)
   - Online Tool and Users Manual (Fall 2013)
Greenhouse Gas Mitigation Options and Costs for Agricultural Land and Animal Production within the United States
Purpose of the Mitigation Report

Facilitate a better understanding of how agriculture producers might respond to incentives to adopt specific GHG mitigating production and land management practices and technologies.

Report Structure

Identify specific GHG mitigating production and land management technologies and practices farmers could adopt if offered financial incentives to reduce the GHG footprint of their operation. Describe each technology or practice, and analyze available data on cost of implementation, potential mitigation, etc.

In addition to the Report, the information will be presented as a series of fact sheets by practice or technology.
PRACTICES CONSIDERED: Crop Production Systems

Field Management and Tillage Operations Mitigation Options

• Reduced Tillage Intensity
  o Switch from Conventional to Reduced Tillage
  o Switch from Conventional Tillage to No-Till
  o Switch from Reduced Tillage to No-Till
• Crop Rotation Changes
• Qualitative Assessments
  o Field Burning Elimination
  o Reduced Lime Application
  o Rice Cultivation

Nutrient Management Mitigation Options

• Reduce Application Rate
• Shift From Fall Fertilizer Application to Spring
• Fall to Split Spring Fertilizer Application
• Use of Nitrification Inhibitors or Urease Inhibitors
• Precision Agriculture
  o Late Spring Nitrate Test (LSNT)
  o Dynamic Base (Adapt-N)
  o Active Nitrogen Sensor
PRACTICES CONSIDERED: Animal Production Systems

**Manure Management**
- Anaerobic Digesters
  - Covered Lagoon Digester
  - Complete Mix Digester
  - Plug Flow Digester
- Covering Existing Lagoon
- Improved Separation
- Nitrification/Denitrification

**Enteric Fermentation (qualitative assessments)**
- Modification of Diet Composition and Level of Intake
  - Increasing Dietary Fat Content
  - Providing Higher-Quality Forage
  - Increasing Protein Content of Feed
  - Decreasing the Forage-to-Concentrate Ratio and Adding Supplemental Concentrates
  - Processing/Grinding Feed
- Monensin and Other Feed Additives
- Breeding for Increased Productivity and Decreased CH$_4$ Production

**Grazing Land Management**
- Legume Interseeding
- Qualitative Assessments
  - Rotational Grazing
  - Fertilization
  - Irrigation
  - SilvoPasture
PRACTICES CONSIDERED: Land Retirement Systems

*Land Retirement Systems*
- Retire Cultivated Organic Soils and Establish Conservation Cover
- Retire Marginal Croplands and Establish Conservation Cover
- Restore Wetlands
- Establish Windbreaks
- Restore Riparian Forest Buffers
For each practice or technology, we provide:

1. A detailed technical description of the technology or practice

2. For “representative” farms, estimates of adoption costs.

3. Estimates of the farm-level GHG mitigation associated with adoption (i.e., increase in carbon sequestration or decrease in GHG emissions).

4. Assess the GHG incentive levels that various “representative” farms would require to consider adoption a break-even undertaking.
Crop Production Systems Breakeven Prices Under $200/mtCO₂-eq (2010$/mtCO₂-eq)

- Switching from Conventional to Reduced Tillage
- Switching from Conventional Tillage to No-Till
- Switching from Reduced Tillage to No-Till
- Crop Rotations, Accounting for Changes in Yield
- Reduced Fertilizer Application, Accounting for Changes in Yield
- Spring Fertilizer Application
- Nitrification Inhibitors
- Variable Rate Technology Nitrogen Sensor
- Variable Rate Technology LSNT Base
- Variable Rate Technology Adapt-N Technology
Animal Production Systems Breakeven Prices Under $200/mtCO₂-eq (2010$/mtCO₂-eq)

- Dairy Farms that Cover Existing Pit, Tank, Pond, or Lagoon as a Manure Management Practice
- Swine Farms that Cover Existing Pit, Tank, Pond, or Lagoon as a Manure Management Practice
- Dairy Farms that Adopt Electricity-Generating Covered Anaerobic Lagoon Digesters as a Manure Management Practice
- Dairy Farms that Adopt Flare-Only Covered Anaerobic Lagoon Digesters as a Manure Management Practice
- Swine Farms that Adopt Electricity-Generating Covered Anaerobic Lagoon Digesters as a Manure Management Practice
- Swine Farms that Adopt Flare-Only Covered Anaerobic Lagoon Digesters as a Manure Management Practice
- Dairy Farms that Adopt Complete Mix Digesters with Electricity Generation as a Manure Management Practice
- Swine Farms that Adopt Complete Mix Digesters with Electricity Generation as a Manure Management Practice
Land Retirement Mitigation Breakeven Prices Under $200/mtCO₂-eq (2010$/mtCO₂-eq)

- Retiring Organic Soils from Cultivation and Establishing Conservation Cover
- Retiring Marginal Soils and Establishing Conservation Cover
- Restoring Wetlands
- Establish Windbreaks
- Restoring Riparian Forest Buffers
Developing Science-Based Methods and Technical Guidelines for Quantifying Greenhouse Gas Sources and Sinks in the Forest and Agriculture Sectors
PROJECT GOAL

Goal: To create a standard set of GHG quantification methods and tools for landowners, USDA, and other stakeholders.

• Phase 1: Report outlining comprehensive science-based methods for entity-scale GHG estimation.

• Phase 2: Develop a user-friendly tool that follows the methods report to provide land owners and managers with reliable and understandable estimates of GHG emissions and C sequestration.

This presentation will focus on current status of the project and the project timeline.
METHODS REVIEW PROCESS

Science-Based Methods

CCPO
Inter-Agency Tech. Rev. May 2012
Scientific Experts Dec 2012/Jan 2013
Public Comment, Final Inter-Agency and USDA Review March - April 2013
Final Report Release June 2013
Our Inter-Agency technical team comprises nearly 70 members across numerous Federal Agencies including USDA, OMB, State, EPA, DOE, DOI, several Whitehouse Offices and others.

Reviewers provided input on the methods proposed as well as the scientific justification.

Comments received are being reviewed by our author teams and final edits are being made prior to the Scientific Expert Review later this fall.
PROJECT TIMELINE AND KEY DATES

- Selected Lead Authors
- Formed Inter-Agency Tech Advisory Group (Jan 2011)
- Published FR Notice for public technical input (Feb 2011)
- Invited key experts to join author teams (Jan 2011)
- First draft completed (Sept 2011)
- USDA initial review and contractor initial editorial review (Oct 2011)
- Tool Development Commences (Feb 2012)
- Inter-Agency Tech. Adv Group review of second draft of methods (May 2012)
- Expert Peer Review of third draft of methods (Dec 2012-Jan 2013)
- Full USDA and Inter-Agency review and public comment (Mar-Apr 2013)
- Ver. 1.0 of Tool available for initial testing (Apr 2013)
- Release of Final Methods Report (June 2013)
- Review and testing of the tool (Ver2.0) and 1st DRAFT users manual (Jun 2013)
- Ver 3.0 Tool and users manual published (Sept 2013)
TRACCR - TRee and Agriculture Carbon CalculatoR
USDA Greenhouse Gas Estimation Tool

**Overview**

**Users**
Farmers/ Ranchers/ Forest Landowners or other stakeholders

**Inputs**
- Acres
- Cattle Count
- IPCC Equations
- Other Equations
- Lookup Tables
- Emission Factors
- Etc.

**Online Estimation Tool**
- Croplands
- Wetlands
- Animal Agriculture
- Forestry

**Outputs**
Report of estimated GHG Emissions and sequestration CO₂, N₂O, CH₄

**Offline Models**
- DAYCENT /CENTURY
- DNDC
- COMET-VR 2.0
- DNDC
- FVS
- Holos
- DairyGEM
- FVS
- iTree, MRLC
- FOFEM

* Algorithms Only
Intended Uses for the TRACCR Tool

- Farm, ranch and forest land owners will use the TOOL to better understand the GHG impact of their management decisions.
- The TOOL will provide land owners and managers with knowledge and understanding to facilitate their entry into state or private registries or markets.
- USDA will use the TOOL to assess local (GHG) performance of conservation programs, practices and initiatives.

TRACCR will likely be useful for or adaptable to the needs of other stakeholders such as NGOs, state or local registries, etc.
HOW C-AGG CAN PARTICIPATE

• Identify workshops for demonstrating key features of tool and seeking feedback from stakeholders (Fall 2012)
• Provide comments during the public review process (Early 2013)
• Provide names of farmers who would be willing to test the tool (Early 2013)
• Provide actual case studies of business as usual practice and implemented alternative practices for reducing GHG emissions (Jan 2013)
Thank you!

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