



EPRI Greenhouse Gas Emissions Offset Policy Dialogue Workshop #11

Creating Nitrous Oxide (N₂O) Emissions Offsets in U.S. Agriculture

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- U.S. non-profit “501(c)(3)” scientific research consortium founded 1973 to perform **objective electricity-related research for the public benefit.**
- EPRI has 450+ participants in more than 40 countries around the world. In the U.S., EPRI participants generate more than 90% of electricity delivered.
- Principal locations — Palo Alto, CA, Charlotte, NC and Knoxville, TN

Goals for EPRI's Offset Policy Dialogue

- Inform key constituencies / stakeholders
- Provide a forum for a facilitated discussion
- Build a common understanding of offset system design elements and issues
- Explore new ideas and approaches
- Discuss potential offset mechanisms



EPRI Offsets Workshops

- 2011
 - W11 - (N₂O Offsets) – November 4, 2011**
 - W10 - California's New Offsets Program
- 2010
 - W9 - Commercial Procurement of GHG Offsets
 - W8 - Offset Development and Approval Processes
 - W7 - "Sectoral" and Scaled-up International Mechanisms
- 2009
 - W6 - "Road Testing" Offset Methodologies
 - W5 - Reduced Emissions from Deforestation and Degradation (REDD)
 - W4 - U.S. Domestic Forestry and Agriculture Offsets
- 2008
 - W3 - Proposed Offset Policy Designs
 - W2 - Additionality & "Supplementarity" Limits
 - W1 - Existing Offset Systems

EPRI Offset Policy Dialogue Participants

- Electric sector
- Finance / Banking
- Agriculture / Forestry
- Oil and gas industry
- Industrial organizations
- Academics / research institutes
- Offset developers / consultants / verifiers / etc...
- Congressional and other legislative staff
- State & federal agencies (ARB, CalEPA, DOE, EPA, USDA...)
- Environmental and other non-governmental organizations (NGOs)
- International participants, including representatives from the United Nations' Clean Development Mechanism (CDM)



11th Workshop Meeting Materials

- Agenda
- Participants list
- Speaker bios
- Background paper:
“Creating Nitrous Oxide (N₂O) Emissions Offsets in Agricultural Crop Production in the United States”
- Speaker presentations and other workshop materials to be available online at: globalclimate.epri.com



Direct URL:

http://globalclimate.epri.com/annual_events__ghg_offset_policy_dialogue.html

Workshop 11 Goals – N₂O Offsets

1. Gain better understanding of the potential to reduce N₂O emissions in agricultural crop production.
2. Insight on strengths and weaknesses of different approaches that can be used to quantify N₂O emissions reductions associated with N management activities.
3. Gain an understanding of the key components of existing and evolving N₂O offsets protocols / methodologies.
4. Explore “common practice” N fertilizer management activities.
5. Gain perspectives from the agriculture community about farmers’ willingness to participate in carbon markets and to alter N fertilizer management activities.

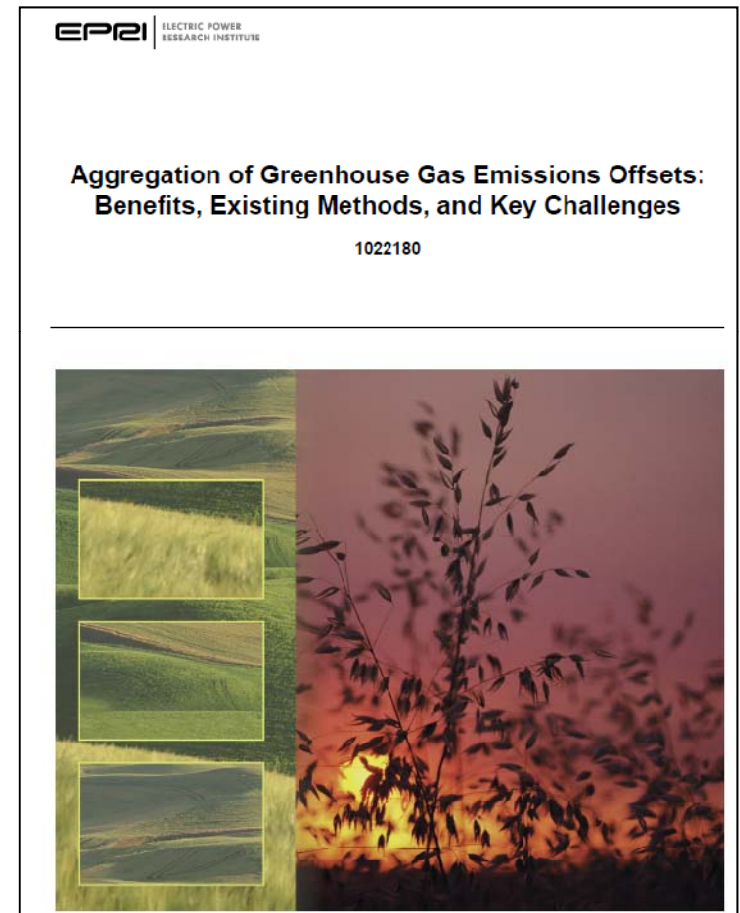
2012 EPRI Offsets Workshops

- Offsets Aggregation – Spring 2012
- “Stacking” Offsets – Summer 2012



Key EPRI Offsets Documents

- **Aggregation of Greenhouse Gas Emissions Offsets: Benefits, Existing Methods, and Key Challenges.** EPRI document #1022180 (2011).
- Emissions Offsets: **The Key Role of Greenhouse Gas Emissions Offsets in a U.S. Greenhouse Gas Cap-and-Trade Program.** EPRI document #1019910 (2010).
- Key Issues in **Designing Mechanisms to Reduce Greenhouse Gas Emissions from Deforestation and Degradation (REDD).** EPRI document #1017998 (2009).
- The EPRI Greenhouse Gas Emissions Offset Policy Dialogue: **Description of Key Issues in the Design of GHG Emissions Offset Programs.** EPRI document #1015633 (2008)
- **“A Comprehensive Overview of Project-Based Mechanisms to Offset Greenhouse Gas Emissions.”** EPRI document #1014085 (2007).



http://globalclimate.epri.com/results_and_publications__ghg_offset_policy.html

EPRI-MSU N₂O Research Collaboration

Developing GHG Emissions Offsets by Reducing Nitrous Oxide (N₂O) Emissions in Agricultural Crop Production



Key Peer-Review Publications

1. Hoben, J.P., R.J. Gehl, N. Millar, P.R. Grace, and G.P. Robertson. 2011. [Non-linear nitrous oxide \(N₂O\) response to nitrogen fertilizer in on-farm corn crops of the US Midwest](#). *Global Change Biology* 17:1140–1152.
2. Grace, P., G. P. Robertson, N. Millar, M. Colunga-Garcia, B. Basso, S. H. Gage, and J. Hoben. 2011. [The contribution of maize cropping in the Midwest USA to global warming: A regional estimate](#). *Agricultural Systems* 104:292-296.
3. Millar, N., G.P. Robertson, P.R. Grace, R.J. Gehl, and J.P. Hoben. 2010. [Nitrogen fertilizer management for nitrous oxide \(N₂O\) mitigation in intensive corn production: an emissions reduction protocol for US Midwest agriculture](#). *Mitigation and Adaptation Strategies for Global Change* 15:185-204.
4. C.P. McSwiney, Bohm S., Grace P., Robertson G., 2010. [Greenhouse Gas Emissions Calculator for Grain and Biofuel Farming Systems](#), *Journal of Natural Resources Life Science Education* 39:125–131.

MSU Web-based Decision Support System: N₂O GHG Calculator

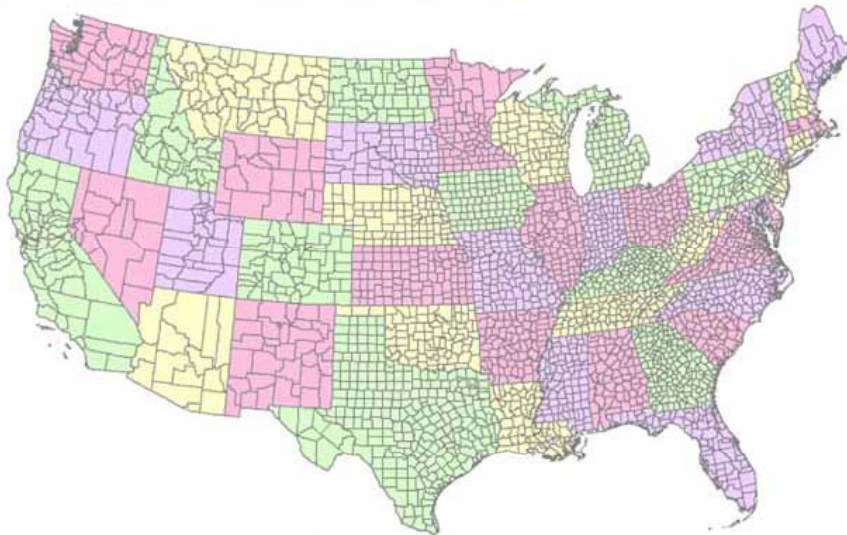


Field crop agriculture and greenhouse gas emissions

About 6% of total greenhouse gas emissions in the US are associated with the agricultural sector. The three major greenhouse gases from agriculture are carbon dioxide (CO₂), nitrous oxide (N₂O) and methane (CH₄). Carbon dioxide is emitted through fossil fuel use on and off the farm (eg. vehicle use and fertilizer production). It can also be emitted or sequestered depending on the type of land and crop management practice used (eg tillage and residue management). Methane emissions predominate in animal agriculture, and are produced during enteric fermentation and through manure management. Nitrous oxide is the major greenhouse gas emitted from crop agriculture, primarily through soil management activities such as nitrogen fertilizer application. Quantifying all three of these greenhouse gases is necessary to determine the importance of farm mitigation options. By altering or adopting management practices, farmers have the potential to reduce their greenhouse gas footprint, and make a substantial contribution to mitigating climate change both regionally and at the global scale.

Calculate and compare the greenhouse gas impact of different cropping systems

To calculate the greenhouse gas impact of different crop rotations and varying management practices, begin by moving your cursor over the map of the US below and click on a county. The next screen will show an estimate of the greenhouse gas cost (CO₂ equivalents) of a 'baseline scenario' corn-soybean rotation in that county, based upon data from the USDA. To see how different management practices and farm conditions alter the greenhouse gas cost of the system, you can then change the crop, tillage type, fertilizer rate and environmental variables to create new scenarios.



- N₂O calculator allows offset project developers, electric companies, and others to quantify potential N₂O offsets and identify the best locations to implement them.
- Calculator makes use of existing USDA and other data.
- Provides comparative CO₂e “costs” of N₂O, soil carbon change, fuel, and fertilizer;
- Allows comparison of different scenarios based on crop, tillage, and fertilizer decisions

www.kbs.msu.edu/ghgcalculator

Status of MSU-EPRI N₂O Offsets Protocol

- Verified Carbon Standard (VCS)
 - Public comments (completed)
 - 1st Validation (completed)
 - 2nd Validation (ongoing)
- American Carbon Registry (ACR)
 - Public comments (completed)
 - Peer review (ongoing)
- Now under consideration as part of the Australian Carbon Farming Initiative (CFI)



Thank You for Participating

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