



C-AGG Report: Outcomes to Date of Collaboration with USDA GHG CIG Projects

Background Information on the Coalition on Agricultural Greenhouse Gases (C-AGG)

C-AGG is a multi-stakeholder coalition of agricultural producers, scientists, methodology experts and developers, carbon investors, environmental ngo's, and project developers that fosters a fact-based discourse on the development and adoption of policies, programs, methodologies, protocols and tools for greenhouse gas (GHG) emissions reductions and carbon sequestration from the agricultural sector. C-AGG's primary objective is to incentivize voluntary GHG emissions reductions opportunities for agricultural producers that enhance productivity and income generation opportunities while benefiting society. For more information on C-AGG, see our website at: www.c-agg.org

C-AGG Collaboration with GHG CIGs

- USDA Natural Resource Conservation Service (NRCS) in FY2011 awarded \$7.47M for Conservation Innovation Grant (CIG) projects to reduce greenhouse gas (GHG) emissions and promote carbon sequestration, hereinafter referred to as the USDA GHG CIG projects.
- C-AGG has engaged with USDA's GHG CIG projects by providing financial support to the USDA GHG CIG project participants to participate in C-AGG meetings and workshops, including informal meetings with USDA staff, in order to promote collaboration, shared learning, and productive, focused discussions on the projects.
- C-AGG devotes specific sessions during meetings and workshops to address USDA GHG CIG and related project updates, successes and challenges.
- C-AGG created a dedicated portal on our website to showcase the USDA GHG CIG and related projects (<http://www.c-agg.org/cig/>), and to allow project participants to communicate and share information in a dedicated online forum; and have utilized our network of participants and stakeholders to share news and information regarding the GHG CIGS and related projects.

This report summarizes our shared learning based on our partnership with USDA GHG CIG project participants. Most of the USDA GHG CIG projects are still operational and have not concluded their three-year grant cycle; this report represents just a snapshot of the successes, challenges, and benefits achieved and encountered to date.

The report is categorized into three broad areas: successes, challenges, and future recommendations.

USDA GHG CIG Project Successes

- **USDA GHG CIG Projects are Informing the Development of the Mandatory CA Cap-&-Trade Program and Voluntary Carbon Market Registries and Protocol Development**
 - The process of developing, planning and implementing the USDA GHG CIG projects has and continues to play a key role in helping to inform ongoing development of agricultural offset protocols and future protocol opportunities in the CA Cap-&-Trade Program as well as in voluntary GHG markets, and market-based registries. The USDA GHG CIG projects have served as project pilots, providing a formative and

developmental bridge to carbon offset markets and the potential role of agricultural projects within these markets.

- This role is particularly valuable given that agricultural offsets represent a new area within offset markets, which has led investors and potential buyers to view them as still high-risk, which will only be overcome once these early projects show success, and build confidence with markets, regulators, and investors (including purchasers of credits).
 - USDA GHG CIG project developers have engaged directly and through C-AGG with CA policymakers to share program requirements and opportunities related to agricultural protocol development, and the CA ARB is currently working to adopt a Rice Protocol based on one of the USDA GHG CIG projects.
 - USDA GHG CIG projects are providing innovative agricultural offset and related, derivative opportunities to the agricultural sector, such as informing sustainable supply chain initiatives and ecosystem market opportunities for the agricultural sector.
 - Significant cross-border (US-Canada) collaboration regarding agricultural offset opportunities has informed the USDA GHG CIG projects and created synergistic progress in CA and within voluntary carbon markets on pathways to quantifying and reducing greenhouse gas emissions in agricultural operations.
- **USDA GHG CIG Project Developers, Collaborators Represent Diverse Backgrounds, Disciplines**
 - USDA GHG CIG project developers and collaborators:
 - Include conservation leaders and stakeholders focused on multiple beneficial environmental outcomes from agricultural ecosystems, including but not solely based on GHG mitigation;
 - e.g., the Chesapeake Bay Foundation (CBF), Ducks Unlimited (DU), Environmental Defense Fund (EDF), and Winrock International (WI)
 - Include key agricultural sector stakeholders seeking to enhance member productivity and sustainability in the face of changing market needs;
 - e.g., The Fertilizer Institute (TFI), Dairy Management Institute (DMI), the California Rice Commission, the California Farm Bureau Federation, the New England Farmers Union, and Shepherds Grain
 - Have trusted relationships with the agricultural sector, including an understanding of the realities of agricultural operations, and are typically valued and recognized agents of change within the sector;
 - Play the valuable role of aggregation and program interpretation for individual producers – in other words, they make possible the ability of individual farms/farmers and groups of farms/farmers to participate in GHG mitigation programs and carbon offset markets, regardless of farm size;
 - Are building the necessary infrastructure to enable successful and cost-effective aggregation, as well as leveraging financing and added value for projects. This includes the development of educational materials, protocol development, recruitment, training, data collection, web-based interface development, purchasing credits, etc.
 - Are developing web-based interfaces that are user (“farmer”) friendly, to simplify and minimize producer data collection requirements and burdens, which can be significant. Some of the USDA GHG CIG projects have developed unique, open access interfaces for their projects and others.

- **USDA GHG CIG Projects Encouraged Collaborative Engagement with Other Programs**
 - The collaborative opportunities provided by the USDA GHG CIG projects have led to significant cross-pollination of agricultural and land-based offset and ecosystem service experiences, including with water quality programs and sustainable agricultural certification programs.
 - Project development encouraged new program outreach and collaborations between NRCS, other USDA agencies, and private sector partners.
 - The Alberta Offset Program experience with Agricultural Offset Protocols and project verification has been a topic of dialogue within C-AGG, and is a valuable source of learning and direction for GHG market and protocol developers, registries, and USDA GHG CIG projects, and continues to help inform program and protocol development.
 - The shared findings of the Office of the Auditor General of Alberta (independent auditors of all Government of Alberta Ministries) through audit reports, as well as presentations by C-AGG Alberta participants reporting on program developments and changes have been particularly instrumental in contributing key learnings, such as describing the characteristics of data management systems needed by project developers and aggregators to bring quality offset ton to markets.

- **USDA Conservation Programs Offer Key Benefits to USDA GHG CIG Projects**
 - Conservation programs in particular are familiar to producers, providing a point of entry for agricultural offset-type programs, and a potential source of funds to help get projects started, and help with producer engagement by “starting the conversation” with trusted sources.

- **Agricultural GHG Mitigation Activities Offer Significant Co-Benefits**
 - The value of agricultural GHG emissions reductions tends to exceed that of non-biological projects, because by their very nature, the emissions reduction co-benefits are multiple, including ecosystem and habitat benefits, water quality benefits, air quality benefits, and enhanced soil and productivity benefits.
 - Environmental co-benefits with agriculture can be and often are significant, but most of these co-benefits are hard to quantify, and/or cannot yet be monetized.
 - Allowing for co-benefits to be recognized or included in criteria for project selection, protocol assessment and development (i.e., determination of which protocols to develop), could help to further incentive investments in agricultural offsets.
 - Over time, monetization of co-benefits and creation of ecosystem service markets can further “grow” this opportunity by adding income streams to agricultural offset projects, thus helping to build the business case.

USDA GHG CIG Project Challenges

- **Project Timelines**
 - While the USDA GHG CIG project cycle is three years, it is clear that the project development cycle is much longer, particularly for these first-of-a-kind projects. Protocol development, farmer recruitment, project implementation, and credit delivery can take five or more years to complete.

- **USDA Conservation Programs**
 - Although most USDA GHG CIG projects benefit from USDA conservation programs as an entrée to participation in GHG mitigation projects, existing conservation program requirements created some challenges, as did the topic of GHG mitigation as a primary focal point of the projects, which required semantic and approach-based adjustments to farmer engagement. Farmers are far more likely to engage in dialogue about enhanced operational efficiencies or efficient input utilization than about GHG reduction.
 - Strict “additionality¹” requirements related to some GHG offset programs complicate the ability of producers to participate in both conservation programs and carbon market offset programs, despite the fact that producer costs are rarely covered by potential carbon market proceeds. Additionality requirements also perversely penalize innovators and early adopters of GHG emissions reduction or sequestration practices.
 - While the availability of EQIP funding to USDA GHG CIG projects was greatly appreciated and potentially highly valuable to the success of the USDA GHG CIG projects, the timing and ability to target the EQIP funding to these projects proved a disconnect, and thus an opportunity lost.
 - The lack of Technical Assistance funds available to State NRCS offices proved challenging in securing engagement and responsiveness from many State NRCS offices, as the EQIP funding was viewed as an additional burden to staff.

- **Producer Engagement**
 - A significant lesson learned is that agricultural producers will engage in projects not based on GHG mitigation opportunities, but rather on enhanced income generation or productivity, input utilization efficiency, and perhaps, to help prevent regulatory threats. We must meet producers where they are at, and identify the pain points or opportunity points that will encourage their participation in GHG mitigation projects in ways that enhance their operations.
 - These obstacles to engagement are not just about semantics – they are cultural and socio-economic. Agricultural producers make management decisions based on knowledge, costs, equipment, available support systems (e.g. technology transfer or availability of best management practice guidance), market signals, and not insignificantly, based on what their peers and neighbors are doing.
 - Practice changes of any kind require decision support systems, and the bigger the practice change, the more important the support system is to inducing the desired change. This is particularly true for practice changes that involve long-term management investments (e.g. capital investments, infrastructure, and equipment). These changes are viewed largely as business decisions, and without the decision support systems, including business case scenarios showing adequate return on investment, even smaller practice changes that might reduce yield or income are viewed as risky – particularly if the financial benefits of participating are uncertain or delayed.
 - Messengers are important. Farmer-to-farmer interactions are most likely to lead to producer engagement and adoption of new practices. Often, innovators have a strong peer following and are viewed as trusted peers/partners who will take risks, tweak the

¹ “Additionality” refers to the concept that GHG emissions reductions credits must result from additional action or action that likely would not have happened in the absence of the incentive provided by the carbon market. C-AGG identified additionality as one of five core principles in its April 2010 report, stating: “Only net reductions of atmospheric GHG concentrations beyond business as usual should be rewarded.” However, in C-AGG’s 2012 Executive Summary on Additionality in Agricultural Offset Protocols, we agree that additionality as it applies to the agricultural sector has a somewhat unique context, and thus should be addressed uniquely, as well.

system to maximize benefits, and optimize financial and co-benefit options for the “win-win” situation.

- Due to offset market additionality requirements, innovators and early actors are generally prohibited from participating in offset markets, which penalizes the leading edge producers who take on the risks of new management practices and who pave the way for wider scale adoption and potential participation in new activities and new programs.
 - Simple educational materials with a sophisticated assessment of benefits and support systems (including available tools) are necessary.
 - Onerous or burdensome program requirements, including high data input and collection needs, and data collection that is not within the current realm of most agricultural producers, is a significant hurdle to producer engagement.
 - Project developers who interpret program opportunities for farmers and deliver the opportunities in a manageable fashion are required to engage farmers. Farmers should never have to see or read a GHG Offset Protocol, or calculate GHG emissions reductions for a protocol.
 - USDA’s COMET-Farm tool is a valuable, user-friendly, web-based tool to help introduce individual producers to GHG mitigation opportunities, and with further development can potentially be used for data collection needs and efforts related to agricultural offset protocol opportunities.
- **Data Needs are High; USDA Data Sharing Opportunities Should be Investigated**
 - GHG methodologies and protocols are data intensive, and there is insufficient data for some project types or agricultural cropping or livestock systems to quantify GHG emissions associated with “common” agricultural practices (baseline estimation), as well as emissions reductions or sequestration associated with certain practices.
 - E.g., there is insufficient data available for specialty crops and cropping systems in some regions, such as CA.
 - Temporal and spatial differences in GHG fluxes (particularly with regard to N₂O) and measurement tools and approaches remain challenging, and require additional research and data collection, and data sharing;
 - A cohesive attempt to identify the most critical data needs for offset protocols and projects is required, and collaboration with USDA and other relevant government agencies could identify access to USDA data that can benefit projects, protocols, models, and overall program development.
 - Data that can be directly downloaded into models or protocol interfaces, or otherwise available in a compatible and accessible format can greatly benefit protocol development, including data management, measurement, and verification systems;
 - Data directly collected from producers needs to be compatible with their ability to collect and deliver the data, e.g., in a format used by/already collected by producers (e.g. amount of diesel used in a certain timeframe, not CO₂ equivalents of fuel used), and needs to be translated elsewhere and by others within the offset system or program.

- **Landscape Uncertainties Related to Program Design, Protocol Development, and Agricultural Opportunities**
 - Without US federal mandatory GHG regulations or requirements, and mandatory and voluntary programs related to agricultural offset program development and design still underway, these project have been largely leading the way in helping to tease out and test:
 - necessary program architecture to accommodate agricultural offset requirements, such as:
 - aggregation approaches;
 - cost-effective, realistic verification approaches;
 - model-based GHG estimation approaches;
 - the need to tailor offset protocol opportunities (based on and derived mainly from very different point-source pollution systems) to highly diverse biological ecosystems subjected to weather and climate variability as well as heterogeneous management approaches and operations;
 - the need for a high degree of flexibility to allow farmers to farm and to manage their operations while also meeting programmatic requirements;
 - flexibility and innovation are not optional within agricultural operations; and
 - barriers to practice change are often high – e.g., technical, operational, equipment/capital investment, inputs, management-related – and require proper technical and operational support in the form of tailored decision support systems and tools for the agricultural sector;
 - The reverse of this is that once implemented, successful practice changes are unlikely to revert.
 - The Cash Match Funding for some of the USDA GHG CIG projects was compromised or lost due to a reduction in value of voluntary carbon market credits coupled with the long timeframe required to fully develop these projects and deliver credits to market.
- **Costs and Benefits**
 - Business case and value proposition uncertainties exist due to the still formative nature of carbon markets and the role of agricultural offset opportunities within them, and the resulting difficulty in estimating credits or the value of credits from any given agricultural offsets project;
 - These uncertainties have limited or stifled full-blown investor, developer (project or protocol), and producer engagement in these early projects – which makes the GHG CIG project investments all the more critical to developing the business case and the certainty needed to develop these opportunities;
 - Not enough successful business case successes exist to convince investors to engage in agricultural offset protocols at this time, further limiting opportunities; and
 - Further programmatic and protocol design investments are necessary to apply the learnings and complete the success of the significant investments made in these projects, to date.

GHG CIG Project Future Recommendations

- **Additional funding for current USDA GHG CIG projects is strongly recommended** to allow successful completion of these projects, to deliver credits to markets, and to provide necessary successful business case scenarios for future producer engagement.

- **Funding of additional USDA GHG CIG projects in the future is also recommended**, to further develop this critical opportunity area for the agricultural sector.
 - Typically, methodology or protocol development requires expertise and significant investment of time, often as long as two years. Once developed, producers must be identified and engaged, and the project must be implemented, which can take anywhere from 1-3 years. After monitoring and verification – which can add up to another 6 months to 1 year, credits can be delivered;
 - The current value of carbon market offsets is unlikely to cover agricultural practice change costs and potential risks borne by participating producers, so additional investments are necessary while program infrastructures and rules and certainty are still in flux and under development; and
 - Credit stacking, particularly with existing conservation programs, and developing ecosystem service markets, can aid in project economics.

- **Funds are often required up front to engage producers and pay for necessary practices change investments.**
 - Offset payments are delivered only after implementation and verification, etc., which leaves a huge temporal financing gap for project developers as well as agricultural producers, thus creating additional engagement risk to project developers, investors, and producers. USDA GHG CIG project investments are invaluable sources of gap funding in the development stages of these markets and projects.

- **Quantification methodologies require further investment**
 - USDA enhancements to tools and GHG support services to agricultural producers (e.g., COMET-Farm) can aid in producer engagement in existing and future GHG offset markets, but harmonization and standardization remain important issues to consider, given the potential impact to producers of multiple programs with varying data needs, and potentially, varied outputs.
 - Transparency and rigor are critical to GHG tools and calculators, and are particularly necessary for market-based transactions, which require higher rigor and certainty than conservation programs.
 - Compliance markets likely require the highest degree of rigor and certainty, as compared to voluntary markets, with conservation programs and sustainable supply chain initiatives likely requiring less comparative rigor.
 - C-AGG supports the development of and investments in low-cost, high value quantification methodologies, including the appropriate development of and use of models (including biogeochemical process models) for agricultural offset programs.
 - Intensity-based metrics should be considered for agricultural offset program opportunities.

- **Critical programmatic and structural issues for agricultural offsets require additional development and stakeholder input and support to further demonstrate and deliver voluntary, market-based GHG mitigation opportunities for the sector.**
 - Policy issues to address include additionality, aggregation, verification, data sharing, and permanence (in the case of sequestration).
 - Structural issues to address include standardized, harmonized decision support systems and tools for the agricultural sector to utilize in carbon markets.

Bovine Innovative Greenhouse Gas Solutions (BIGGS)

Summary

The purpose of Bovine Innovative Greenhouse Gas Solutions (BIGGS) Pilot Project is to enable beef and dairy producers to create and sell voluntary carbon offsets to buyers. Our intention is for stakeholders in the U.S. beef and dairy supply chain to successfully participate in a voluntary greenhouse gas (GHG) offset program that is science-based and meets their triple bottom-line needs and concerns. The BIGGS pilot project is adapting and testing GHG protocols from Alberta that generate voluntary carbon offsets and demonstrate decreased carbon intensity of beef and milk produced in the beef and dairy sectors.

The project is being implemented over a 3-year period.

Years 1 & 2 – Protocol adaptation, Design and development, Implementation

Years 2 & 3 – Implementation, Operations, Market demonstration and Evaluation

The project is designed to develop best practices/systems associated with voluntary bovine GHG offsets:

- Streamline complex data management requirements
- Create diverse systems producers can use to quantify voluntary offsets
- Monetize and serialize verifiable carbon offsets
- Close knowledge gaps associated with bovine-targeted voluntary GHG offsets
- Assess the costs, benefits and potential production efficiency gains realized by feedyard and dairy operations when implementing the GHG-reducing practices

This project's goal is to capitalize and leverage Alberta's experience and aggregate records from a total of 25,000 head of dairy cattle and 500,000 head of beef feedyard animals. Project partners include dairy and feedyard cooperators across the States of Texas, Kansas, Nebraska, New Mexico, Ohio, Wisconsin, Michigan and California.

Successes

- The Reduced Carbon Intensity of Fed Cattle protocol (amalgamation of 3 Alberta Beef protocols) was successfully adapted through the Protocol Scientific Adaptation Team process² and is currently in its final stage of review with the American Carbon Registry.
- The Dairy protocol adaptation process is near completion – sensitivity testing on herd components will greatly streamline implementation of the protocol, with a focus on dry cows and lactating heifers only.
- At least 3 new scientific papers have been submitted, describing meta-analyses and research results as a result of the work (enteric methane relationships with use of (1) monensin, (2) lipid content of the diets and (3) forage quality; as well as new nitrogen retention curves for dairy and beef cattle. The research conducted by the PSAT team has also been included in an FAO report, *Mitigation of Greenhouse Gas Emissions in Livestock Production*, which collates all the literature to-date on greenhouse gas mitigation for manure management and enteric fermentation.³
- A common data management/quantification framework is being developed to enable aggregation.

Challenges

- The evolving policy landscape with carbon registries/programs has delayed methodology adaptation, approval and project implementation.
- The needs to prepare and submit scientific manuscripts to refereed journals, as well as coordinate the review of several protocols, and gain scientific consensus, was underestimated in terms of project time.

Please contact Matt Sutton-Vermeulen for additional inquiries at mattsv@prasinogroup.com or at 515-343-5149.

² The PSAT process was led by Dr. Ermias Kebreab, UC Davis and consisted of extensive scientific work and review by a team of 15 scientists from across the US and Canada.

³ http://www.usdairy.com/Sustainability/News/Pages/Sustainability_2013_08_Research_advances.aspx



Bringing Greenhouse Gas Benefits to Market: Nutrient Management for Nitrous Oxide Reductions
Delta Institute

Partners: American Carbon Registry; American Farmland Trust; Conservation Technology Information Center; DNDC-Applications, Research and Training (DNDC-ART); Eliav Bitan (former National Wildlife Federation co-PI); EKO Asset Management Partners; Oklahoma Conservation Commission; Oklahoma State University

Total Project: \$840,000; \$400,000 in USDA NRCS funding

Location: Illinois, Michigan, Oklahoma

Project Description: The primary objective of this three-year project, ending in July 2014, is to support farmer implementation of innovative nutrient management practices through greenhouse gas (GHG) credit markets. The team is working with farmers and agricultural consultants to test multiple models and protocols to estimate and credit on-farm nitrous oxide (N₂O) emission reductions, with the ultimate goals of generating revenue for conservation and translating the outcomes to a broader policy context. We have explored three primary outreach mechanisms: aggregating individual projects through local partnerships, expanding existing watershed networks, and leveraging the Environmental Quality Incentives Program (EQIP) Greenhouse Gas Initiative. To facilitate efficient data collection and scenario planning, we have emphasized the NRCS COMET-FARM web tool. COMET-FARM captures most of the location and management data required by the fertilizer N₂O protocols adopted by the three voluntary credit registries. The input data can be exported to the DeNitrification-DeComposition (DNDC) model, which is used by the American Carbon Registry (ACR) *Methodology for N₂O Emission Reductions through Changes in Fertilizer Management* for a range of crops and practices. For farmers who do not use COMET-FARM or are eligible for the ACR nitrogen rate reduction protocol for corn, the team has created a spreadsheet tool to quickly generate N₂O reduction estimates and evaluate credit revenue potential.

Summary of Progress Since 2011: In testing and evaluating the fertilizer N₂O protocols adopted to date, our team has made progress in several areas:

- Analyzed protocol requirements and clarified data needs to farmers and agricultural stakeholders;
- Created a standardized field data collection process to minimize input time and streamline credit generation, evolving from a web-based form to a hybrid of COMET-FARM and new open-source tools;
- Partnered with Terra Global Capital and DNDC-ART to provide recommendations to NRCS staff and the Colorado State University developers of COMET-FARM that were incorporated during beta testing;
- Leveraged watershed-focused workshops and field demonstrations in Illinois to educate farmers interested in “4R” nutrient management about the opportunity to earn GHG credits;
- Recruited wheat growers in Oklahoma using variable rate technologies, including GreenSeeker;
- Worked with Michigan State University researchers to submit the first agricultural N₂O offset project, using the ACR methodology MSU developed in partnership with the Electric Power Research Institute.

Key Challenges and Opportunities: Across these areas, the project team has found that having appropriate technology and building from locally-led efforts are essential to encouraging farmer participation. We also saw how making targeted funds available, as was done in the FY2013 EQIP GHG Initiative, can generate significant interest for adopting new conservation practices. However, current rules and procedures around data confidentiality limited the team’s ability to directly engage EQIP-funded farmers. Regarding credit quantification and market development, the project team has discovered that the prescriptive, whole-farm focus of GHG markets is often at odds with the highly-variable, incremental nature of enhancing management practices. Furthermore, the model-based quantification approach is compromised by a lack of field measurement data for many crops, practices, and regions. As a possible pathway forward, we are currently exploring the use of a hybrid approach detailed in the recently-released draft of the USDA Climate Change Program Office’s *Science-Based Methods for Entity-Scale Quantification of Greenhouse Gas Sources and Sinks*.

Farm Smart™

A Conservation Innovation Grant funded Sustainability Initiative being developed through the Innovation Center for U.S. Dairy® in collaboration with dairy producers and stakeholders across the dairy value chain

Farm Smart™ basics

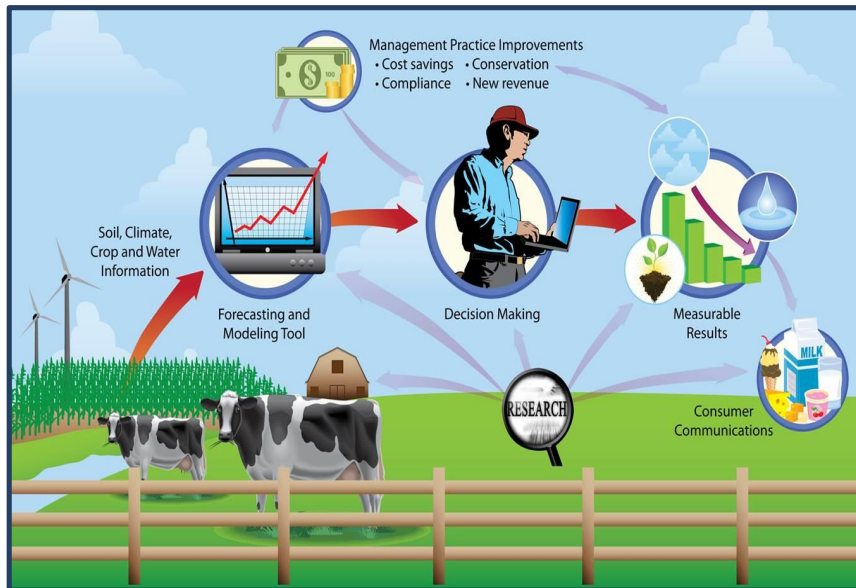
CIG Members: Allen Dusault, Director, Farm Smart; Roberta Osborne, Manager, Farm Smart

Location(s) of Project: The focus is on the 12 charter states ó California, Florida, Idaho, Michigan, Minnesota, New Mexico, New York, Oregon, Pennsylvania, Texas, Washington, and Wisconsin

Farm Smart™ description

Farm Smart™ is an innovative, integrated online management system that empowers dairy producers to continuously improve their operations with environmental, social and economic values. Its science- and practice-based resources and tools aim to help producers reduce their environmental footprint while identifying new sources of cost savings and revenue. It will also deliver benefits throughout the grass-to-glass value chain to dairy processors, retail distributors and consumers.

Producer-tested, farm-focused



Being developed by and for dairy producers, Farm Smart integrates science with individual farm data to bring an objective, robust management system to each farm and field. Because each dairy operation faces unique conditions (climate, soil type and quality, herd size, energy use, financial capabilities, watershed location, and regulatory requirements), Farm Smart had to be customizable. With diversity in mind, it is being developed so that producer can import site-specific information to create and implement a

uniquely customized plan for sustainable farm management. Farm Smart will provide the ability to assess and mitigate their environmental profile, track and measure their progress, plan for future improvements and report outcomes of practice changes to customers, community members, regulators and other stakeholders.

Farm Smart™ 2013 Milestones and Update

In 2013, Farm Smart achieved several major accomplishments. Important milestones include the following:

Farm Smart Version 1.5 Released. An online environmental assessment tool for dairy producers to use nationally was tested and released this year. Designed to provide a picture of a dairies' environmental footprint, including its greenhouse gas emissions, the tool give producers an estimate of five indicators of environmental performance, including energy, water quality and consumption, as well as methane, carbon dioxide and nitrous oxide emissions. In fact, it captures the full life cycle impact of the farms' footprint embedding offsite greenhouse gas emissions, for example, from imported feed as well.

The Farm Smart tool was tested on over 40 farms across the country encompassing over 60,000 cows in nine states, 60,000 acres of land and 150 million gallons of milk produced annually.

Importantly, Farm Smart is now being tested and used by several major retailers and brands including Starbucks and Land O'Lakes. That effort will result in wider adoption across the value chain allowing a "grass to glass" environmental footprint for dairy products

Research and Development. Farm Smart Version 2.0 is now under development. This next version will go beyond the environmental assessment and reporting function of Farm Smart 1.5 and include decision support functionality. This will be a powerful capability that will allow dairy producers to evaluate new technology and practice options that will reduce their greenhouse gas emissions while also benefiting the dairy producers' bottom line. It is also being designed to integrate GHG process models like the Denitrification-DeCompostion Model (DNDC) and Comet Farm allowing robust and scientifically supported emissions reduction. This will help the industry meet its commitment of a 25% reduction by 2020.

Co-created and Producer-tested -Smart Beta Version 2.0 will be tested on over 80 dairy producers in 2014 in 12 states. This will be complimented by co-op and brand testing over an even larger number. We are also partnering with DOE-Idaho National Labs that is using a super computer to manage data.

Industry Collaboration. Two stakeholder teams - the Farm Smart Technical Work Group and Farm Smart Advisory Team - are helping to guide the development and implementation of the Farm Smart tools. Participants, comprised of a cross section of the dairy food chain from cow to consumer, includes, leading academics, agronomy, regulatory, conservation, food processors and environmental experts. Importantly, we have also formed a partnership with the University of Wisconsin, Madison, and other institutions capturing nearly \$10 million in USDA AFRI-CAP grant funding to do additional greenhouse gas research on GHG emissions from dairies as well as engage in stakeholder outreach and education.

Best Management Practices. A partnership with NRCS has recently been consummated that will allow us to incorporate the NRCS Best Management Practices (BMPs) database into our tool which will serve as a mechanism to aid producers in maximizing the environmental outcomes of stewardship practices. Ultimately, Farm Smart will guide producers in determining the practice changes that will maximize environmental results, enhance the dairy operations' economic returns and measure progress.

Estimating Nitrous Oxide Reductions from Nutrient Management in the Chesapeake Watershed

Project Partners: Chesapeake Bay Foundation (CBF), Environmental Defense Fund, Virginia Tech, DNDC Applications LLC, EcoFor LLC, Sterling Planet (SP), Washington Gas Energy Services (WGES)

Summary:

The goal of the three year project was to encourage adoption of enhanced nutrient management techniques by facilitating the process by which Chesapeake Bay farmers can participate in, and financially gain from, carbon offsets markets. Specifically, one objective was to calibrate and develop a region-specific, user-friendly version of the Denitrification-Decomposition (DNDC) model and use it to estimate the nitrous oxide emissions reductions associated with different nutrient management approaches: soil testing/adaptive management on farms in South Central Pennsylvania and variable rate technology (i.e., GreenSeeker) on grain farms on Virginia's Eastern Shore. This project allowed us to compare and contrast these approaches in terms of greenhouse gas benefits, nitrogen application reductions, and obstacles to greater implementation. In addition, our hope was to certify resulting carbon credits in the American Carbon Registry (ACR). A unique aspect of this project was the leveraging of dollars from a partnership that CBF has with WGES and SP whereby WGES and SP are donating some of the proceeds from the sale of carbon offsets to WGES customers into a Carbon Reduction Fund that CBF uses for projects that benefit water quality and reduce greenhouse gases.

Successes:

- The DNDC model was calibrated for corn, rye, soy and wheat rotations in this region using a long term dataset from a USDA-Agriculture Research Service Project in Beltsville, MD. In addition, we developed a web-based user-friendly interface for DNDC that contains an entry portal for farm and crop management data; a Web-GIS interface for digitizing of farm fields; and automatic extraction of soil and weather data.
- The project resulted in the implementation of more than 2,000 acres under adaptive nutrient management in Pennsylvania and roughly 14,000 planted acres⁴ (over 5 years) under variable rate technology (GreenSeeker) in Virginia (VA).
- The project succeeded in quantifying emission reductions from the implementation of the GreenSeeker technology in VA. We were able to run DNDC model scenarios consistent with the ACR protocol and demonstrate the potential of this nutrient management approach to generate certifiable carbon credits.

Challenges

- Obtaining the necessary level of historic farm management data (~previous 5 years) to calibrate the DNDC model and to establish a reliable baseline proved to be a major challenge to nutrient management carbon credit generation.
- We had difficulty determining if the project met the requirements for additionality under the ACR protocol. In particular, since implementation of GreenSeeker was incentivized by supplemental EQIP dollars, we were unsure if the financial implementation barriers faced by the project were solely overcome as a result of carbon market incentives.

For more information contact Beth McGee (CBF), bmcgee@cbf.org or 443-482-2157.

⁴ Note "planted acres" are more than "available acres" since typically a farmer plants more than one crop in a season.

MANAGING WESTERN RANGELANDS FOR SOIL CARBON BENEFITS

A USDA Funded Conservation Innovation Grant funded partnership with

Colorado State University - Environmental Defense Fund – University of California at Berkeley

Total Project Funding: \$1,277,746

USDA Grant Funding: \$638,793

PROJECT SUMMARY

Rangelands throughout the West hold tremendous promise for soil carbon sequestration due to their large scale. Today, ranchers and grassland managers have few economic incentives to manage these rangelands for carbon and other ecosystem benefits. This USDA funded CIG aims to change this with the development of rangeland based carbon offset projects—so that tomorrow, ranchers will be able to participate in emerging carbon and ecosystem service marketplaces. This project has two main goals: 1) determine a set of cost-effective best management practices that increase soil carbon sequestration and other ecosystem services on rangelands; and 2) develop accounting protocols based on these practices.

PROJECT STATUS

Three years into our project, several rangeland conservation and management practices are under assessment including: avoided conversion of grasslands to croplands, and improved rangeland management through grazing changes, and compost amendments. The assessment of these practices includes field sampling across several states, then analyzing and integrating these samples into the CENTURY model. We have also begun conducting an analysis of the environmental co-benefits of rangeland conservation and management practices and an economic feasibility study.

We have made significant progress in writing two greenhouse gas accounting protocols to date: Avoided Conversion of Grasslands to Croplands (ACoGS) and Compost Additions on Grasslands (Grasslands Compost). In collaboration with Ducks Unlimited, the Climate Trust, The Nature Conservancy (TNC) and Terra Global Capital, the ACoGS protocol was approved by American Carbon Registry in October 2013. In collaboration with our partners, Terra Global Capital and the Marin Carbon Project, we have finalized our Grasslands Compost Protocol and have submitted it to ACR for approval by mid-2014. EDF has begun a series of stakeholder outreach sessions on the Protocol in California, the Southwest, and the Midwest.

Reducing N₂O Losses from Cropping Systems for Environmental Credits with Fertilizer BMP's

Summary

Nitrogen management on cropland has large effects on both the productivity and environmental impact of agricultural systems. One of the largest sources of greenhouse gasses from cropping systems is N₂O emissions from agricultural soils. Variations in source, rate, timing, and placement of nutrients in combination with variable landscape, climate, and other management practices present an opportunity for continued optimization of nutrient management and associated environmental outcomes. Using methodologies developed to quantify emissions this project is exploring possible pathways to incentivize improvements in nutrient management resulting in improved production efficiencies and reduced N₂O emissions. The project team has conducted analyses for growers who were willing to share current nutrient management information to understand what opportunities exist for reducing emissions through future management changes. Project partners include The Fertilizer Institute, Camco Clean Energy, ClimateCHECK, The Climate Trust, and the International Plant Nutrition Institute.

Successes

- The project team has conducted analyses for 24 crop fields evaluating a wide range of current and future management scenarios.
- Analysis has shown potential to achieve meaningful reductions with management changes if the process can be streamlined, and value can be demonstrated to the producer.
- Methodology initiated in Alberta being adapted to Midwest corn production systems provides greater accessibility to growers and scalability for project developers in future applications.
- EQIP sign-up associated with this project was successful, \$1.4 million went to growers for practice implementation and over \$7.5 million in total funding was requested.
- Completed a meta-analysis on literature regarding the impact of fertilizer management practices on N₂O emissions in US and Canadian corn production systems.

Challenges

- Data requirements for analysis are upfront and extensive. Required data usually exists, but identifying potential reductions requires large upfront investment of time and resources.
- Compared to traditional USDA incentives and cost sharing, value of an emission reduction credit from this project type is unknown. Engagement is difficult without a clear value proposition.
- Changes in nutrient management often have positive economic impact for crop producers; however, they also have upfront implementation costs and can introduce different risks into the production system.
- Although analyses have been conducted, experience with verification for this project type is limited. Current verification requirements are extensive for an unknown credit value.
- While a significant number of growers signed up for practices which could reduce N₂O emissions; EQIP procedural issues and carbon market requirements challenge the prospect of engaging with program participants to quantify reductions and develop credits.

Please contact Theo Gunther for additional inquiries at tgunther@tfi.org

DEMONSTRATING GREENHOUSE GAS EMISSIONS REDUCTIONS IN CALIFORNIA AND MIDSOUTH RICE PRODUCTION

A USDA Funded Conservation Innovation Grant in partnership with

California Rice Commission – White River Irrigation District – Environmental Defense Fund
Terra Global Capital – Winrock International – Applied GeoSolutions – Point Blue Conservation Science
Total Project Funding: \$2,180,306 USDA Grant Funding: \$1,089,343

PROJECT SUMMARY

The project's goal is to create incentives for US rice producers to reduce their GHG emissions by participating in voluntary and compliance carbon offset markets. The CIG project will reach this goal through two main tasks: 1) implement first-of-its-kind GHG emission reduction demonstrations with rice producers in California and Arkansas, two of the country's leading rice-producing states and 2) analyze the demonstration's replication potential in other rice producing states including Louisiana, Mississippi, Missouri, and Texas. The pilot projects are field-testing various GHG reducing practices, and the GHG quantification of these practices relies on the DNDC model (DeNitrification-DeComposition). The pilots, along with assessments of economic and environmental impacts, will provide a cohesive understanding of replication potential across the nation's rice-producing regions. Furthermore, we are developing user-friendly technology that combines performance- and practice-based approaches to help producer's access carbon markets. Lessons learned with rice producers and the creation of a protocol will support the eventual transfer of conservation technologies and innovative market-based approaches into NRCS policy and programs. This initiative builds on continuing work by Environmental Defense Fund (EDF) in California and Winrock International (Winrock) in Arkansas, carried out in collaboration with the leading rice industry associations and rice producers in each region.

PROJECT STATUS

Pilot Projects

- Pilot projects continued in California (for the 2nd year) with five producers and almost 5,000 acres.
- Arkansas conducted its first year of pilot projects with over ten producers.

Environmental Assessment

- Point Blue Conservation Science completed its two year study of the effects of proposed GHG-reducing rice management practices on water birds.
 - The second year focused on estimating the impact that baling has on rice ground densities.
 - Point Blue will provide a progress report with year 2 results in November.

Protocols

- In March, the California Air Resources Board began a compliance protocol rulemaking process for a U.S. Rice Cultivation Protocol for use in the California cap-and-trade market.
- In May, the American Carbon Registry approved the *Voluntary Emissions Reductions in Rice Management Systems* methodology, which includes the parent methodology and a CA module.
 - A Midsouth module of the *Voluntary Emissions Reductions in Rice Management Systems* methodology just completed the second round of peer review.
- The DNDC model was calibrated and validated, as part of the methodology, for use in Arkansas, Louisiana and Texas.

User-friendly Technology

- EDF and Terra Global Capital have partnered with DNDC-ART to create a "middle layer" tool, which will better meet the needs of rice producers by facilitating two-way communication with aggregators, verifiers and regulators.
 - The prototype of this tool should debut shortly to test with pilot-producers.

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Avoided Grassland Conversion Carbon Project

Summary

Grassland conversion, both native prairie and restored grasslands such as those under the Conservation Reserve Program, is an ongoing resource concern that has been amplified in the last several years in response to a myriad of factors: high crop commodity prices, new crop technologies, and policies that inadvertently incentivize the expansion of cropland production. Ranchers and other grass-based producers have had limited additional economic incentives to protect these Grasslands, which provide an important source of forage and also critical environmental benefits including soil carbon sequestration and storage. This innovative project is both developing the policy structure for producers to maintain grasslands through participation in the carbon marketplace and also testing this structure through a pilot project. An initial group of five to fifteen individual producers, including cow-calf production and mixed (cow-crop) operations will participate in this project. Approximately 5,700 acres of native grassland and an additional 700 acres of wetlands in the Prairie Pothole Region of the Northern Great Plains will be protected for wildlife and livestock use. Project partners include Ducks Unlimited, The Nature Conservancy, The Climate Trust, Environmental Defense Fund and Terra Global Capital.

Successes

- Project partners co-authored an Avoided Conversion of Grasslands and Shrublands offset project methodology, approved by the American Carbon Registry in October 2013. This is the first methodology of its kind.
- Ducks Unlimited has aggregated a pool of producers that are interested in participating in the project, and are beginning the certification process for project- derived offsets.
- Project partner, The Climate Trust, brokered a purchase agreement for project verified offsets with a large multi-national corporation.
- The EQIP sign-up associated with the project was wildly successful, generating nearly \$12 million in producer requested assistance during a brief 30 day sign-up period. Contracts are still being finalized, but to date \$3.1 million has been committed to the highest priority applications and producing a list of 8 to 10 producers interested in participating in future carbon program enrollments.

Challenges

- Data availability for model-scaling has been proven difficult. Direct measurement of soil carbon through soil sampling is prohibitively expensive, requiring a scaling approach and use of existing data supplemented with targeted additional measurements. Coordination of existing data sets, making calibration and validation data for existing programs (DAYCENT, Comet Farm) more readily accessible would make this task easier for future applications.
- Permanence- Soil carbon projects require long-term protection to insure that project carbon benefits are real. This has required the use of perpetual conservation easements, which are expensive and often unpopular with producers. The expense of the easement exceeds the current market value of carbon offsets that can be realized from a project, requiring outside funds from non-GHG funding sources, limiting potential scalability of the project.

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FOR IMMEDIATE RELEASE

October 30, 2013

Conservation Partnership Celebrates Innovative Prairie Preservation Project

Economic incentives protect traditional rural livelihoods, critical habitat and reduce greenhouse gas emissions

WASHINGTON, D.C., Bismarck, N.D. and PORTLAND, Ore. – The USDA Natural Resource Conservation Service (NRCS), along with project partners Ducks Unlimited (DU), The Climate Trust (TCT) and The Nature Conservancy, today announced positive results from their joint collaboration – an innovative Avoided Grassland Conversion carbon project. The project is one of nine groundbreaking climate change initiatives selected and funded by the NRCS's 2011 Conservation Innovation Grant (CIG) program, and is focused on greenhouse gas (GHG) mitigation for one of the least protected and most imperiled ecosystems in the world.

The grassland and wetlands of North America not only provide vital habitat for a host of wildlife, including migratory birds, but also a rich and resilient forage for livestock, and a significant carbon sink if left uncultivated. Unfortunately, pressures to convert native prairie are intensifying with high commodity prices. In addition, new farming technologies make crop production possible on lands once considered unsuitable.

The first outcome of this project is a collaborative effort between DU and NRCS that is preserving the soil carbon sequestered in the North Dakota counties of Burleigh, Emmons, Kidder, Sheridan, McLean, Stutsman, Logan and McIntosh by avoiding the conversion of these valuable prairies to cropland. This area is part of the Missouri Coteau region, a vast region of grasslands and wetlands that stretches across North Dakota and South Dakota and benefits livestock and wildlife.

Carbon that is otherwise sequestered, or trapped long-term in the soil, is released to the atmosphere in the form of carbon dioxide when soils are tilled or disturbed. Under the leadership of Ducks Unlimited, the project successfully enrolled 114 eligible landowners and 50,000 acres in this cutting-edge program, and worked with partners to create an environmentally robust accounting methodology to quantify the carbon that remains in the soil as carbon offset credits.

Newly approved by the American Carbon Registry (ACR) and co-authored by project partners DU, TCT, The Nature Conservancy, Environmental Defense Fund and Terra Global Capital, the *Avoided Conversion of Grasslands and Shrublands (ACoGS)* carbon offset methodology is the first of its kind and provides real opportunities for achieving a meaningful level of emissions reductions in the agriculture sector. In practice, the ACoGS protocol will enable grassland-based agricultural producers to earn income from the sale of carbon credits generated through the preservation of their grasslands.

This project provides Northern Great Plains producers with new ways to earn income from conservation activities, expanded opportunity for outdoor recreation and an opportunity to create jobs in their communities, said Robert Bonnie, USDA Under Secretary for Natural Resources

and the Environment. The American Carbon Registry's approval of this innovative ACoGS protocol enables vital projects like our partnership with Ducks Unlimited to preserve a treasured national landscape, while also preventing the release of greenhouse gas emissions.

Rural communities will not only benefit from project payments, but could also see economic benefits from outdoor recreation opportunities on grasslands, attracting hunters, photographers, and other nature enthusiasts from across the country, said Steve Adair, director of DU's Great Plains Region. Research has shown the economic benefit of wildlife provided from grasslands is estimated at \$63 per acre. This equates to money-in-hand for these rural populations.

What's great about this project is that it opens new opportunities to compensate ranchers for continuing to produce the benefits they have historically provided - the conservation of our grasslands for the benefit of people and wildlife - that are now at risk from rangeland conversion, said Joe Fargione, The Nature Conservancy's Director of Science for North America.

Agriculture accounts for approximately 8 percent of total U.S. GHG emissions - while agriculture's emissions have increased 11.5 percent since 1990. Specifically, more than 750,000 acres of native grassland were converted to cropland from 1997 to 2007. In the Prairie Pothole Region of Montana, North Dakota and South Dakota, annual losses of native grasslands have averaged approximately 50,000 acres per year since 2007, leading to a significant loss of soil carbon, and emitting 20-75 MTCO₂e/acre. Final project benefits are estimated to perpetually conserve 5,000 - 6,000 acres of native mixed-grass prairie. The protection of grasslands will also indirectly protect 500-600 acres of seasonal and semi-permanent wetlands situated in the protected grasslands.

In addition to the significant GHG emissions reductions achieved by this project, carbon financing allows local ranch families to maintain their traditional livelihood of cattle grazing by providing economic incentives, said Dick Kempka, Vice President of Business Development for The Climate Trust. The project also generates significant environmental co-benefits by enhancing water retention, air quality and soil quality, in addition to preserving habitat for at least four endangered species that call the grasslands home.

The process of developing, planning and implementing the USDA CIG climate change initiatives has played a key role in helping to inform ongoing development of agricultural offset protocols with a national impact. This offset protocol will allow farmers and ranchers from across the United States to earn revenue for conservation practices from emerging environmental markets such as California's carbon market, said Robert Parkhurst, director of agriculture greenhouse gas markets at Environmental Defense Fund. These projects have served as pilots, providing a bridge to carbon offset markets and the potential role of agricultural projects within these markets.

The DU-led prairie preservation effort is a primary example of how collaborations of this nature can accomplish a great deal by everyone doing their part to reach mutually beneficial goals.

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