



American Carbon Registry Update on Agricultural Protocol Development

***C-AGG Meeting
Sacramento, CA
February 29, 2012***





Agriculture and livestock protocols

- Reducing N₂O emissions from fertilizer:
 - ACR DNDC-based fertilizer methodology
 - MSU/EPRI methodology for fertilizer rate reduction
- Reducing GHG emissions in rice cultivation:
 - California and Midsouth modules
 - Reduce methane, manage water and reduce diesel emissions
- Livestock:
 - Manure biodigesters (USDA/CEC funded): combining GHG reductions with air quality improvements
 - ARB Compliance Offset Protocol - Livestock Projects



Agriculture and livestock protocols

- Livestock cont'd:
 - BIGGS: modifying Alberta beef and dairy protocols for U.S.
 - Beef – edible oils
 - Beef – reduce days on feed
 - Beef – lifecycle
 - Dairy – multiple practices
 - Comprehensive livestock grazing systems methodology
 - Initial focus on rotational grazing systems
 - Grassland revegetation in China (under Panda Standard)
- New England:
 - Fertilizer management
 - On-farm energy efficiency, fuel substitution in greenhouses
 - “Whole farm” GHG protocol

N₂O emission reductions through fertilizer rate reduction

- Submitted March 2011
- ACR internal review and revisions
- Public comment May-June 2011
 - Comments and responses posted on ACR
- Three rounds of peer review by leading U.S. and Canadian experts on fertilizer N₂O emissions
 - Comments and responses posted on ACR

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N₂O reductions through fertilizer rate reduction (MSU/EPRI)

- Any fertilizer practice following BMPs is eligible, but only reduction in rate is credited
- Standardized approach to additionality: any reduction from BAU fertilizer rate that not mandated by regulations is additional
- Baseline = BAU based on yield-goal based fertilizer rate, calculated from 1) producer-specific records or 2) back-calculation from NASS crop yields and yield goal rates
- Quantification of baseline and project emissions: Tier 2 equation for 12-state U.S. North Central Region and corn/corn rotations, IPCC Tier 1 default factors elsewhere
- Conservative, practices limited (rate only), but based on strong science and comparatively simple to apply and verify



Emission Reductions in Rice Management Systems

- Public comment and peer review complete for version including:
 - Straw removal after harvest
 - Dry seeding
 - Reduce winter flooding
- Now developing CA early drainage module; greater uptake potential
- Standardized additionality for straw removal and dry seeding based on low adoption rates; project-based for reduced winter flood
- Developing early adopters fix





Demonstrating GHG reductions in California and Midsouth rice

- CIG partnership of EDF, CA Rice Commission, USA Rice, Terra Global, DNDC-ART, UC Davis, UC Coop Ext, Winrock, White River Irrigation District, PRBO
- Road-test protocol, help CA and AR growers register projects, analyze replication potential across Midsouth, analyze wildlife habitat impacts
- CA pilots in dry seeding, straw removal etc. → early adopters
- Midsouth projects → methodology module in development
 - Early drainage
 - Intermittent flooding
 - Water management through side inlets
 - Staggered winter flooding
 - Straw removal after harvest
 - Change varieties
 - Improve diesel pumps / convert to electric

10 growers;
minimum 1,000 acres



Key issues

- **Standardized benchmarks for additionality**
 - What should threshold be? Both dry seeding and straw removal
~4% adoption in CA
 - Retain project-specific option for activities for which adoption rates difficult to calculate, but still can be demonstrated additional
 - **Baseline approach**
 - Baseline setting not necessarily same as additionality approach
 - How to incentivize early adopters? Baseline based on past 5 years on own fields, or typical industry practice? Other options?
 - **Up-front calibration and validation needed to prescribe model structural uncertainty adjustment**
 - **Need for user interface and data management tools**
- All key issues for ARB compliance protocol



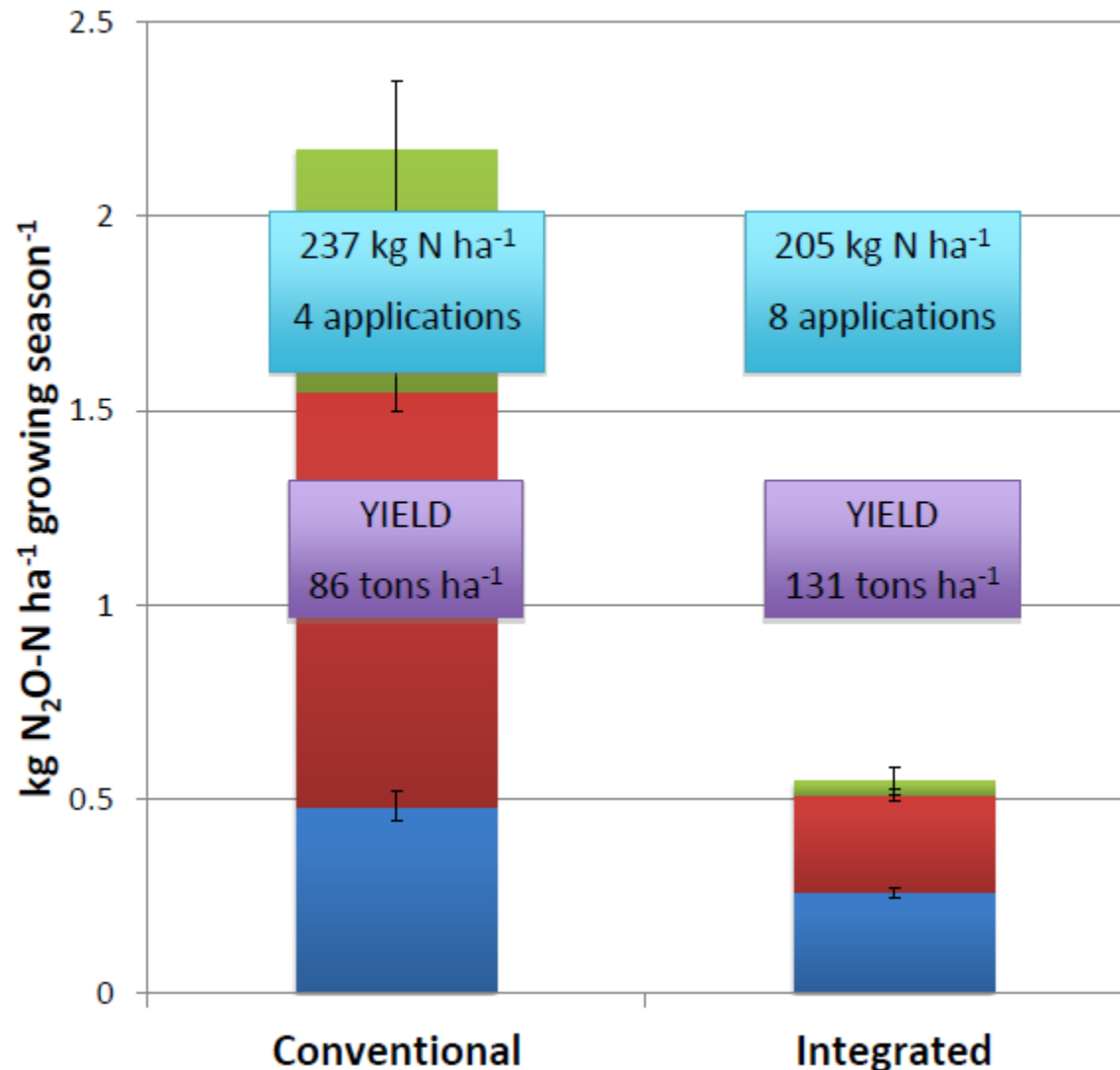
Road-testing ACR fertilizer protocol on California tomatoes

- CA Farm Bureau, EDF, UC Davis, ACR, DNDC-ART, SureHarvest
- 2 pilots – Yolo and Fresno Counties
 - Shift from furrow to subsurface drip with fertigation; cover crop; shift to 80” beds with 2 rows; use nitrification inhibitors; pre-sidedress test...
- Working with UC Davis to compile calibration data from past projects and collect validation data
- Grower outreach
- Road-test protocol, develop user interface tools, explore aggregation models, inform ARB compliance protocol



Conventional vs. “integrated” N management on tomatoes

- “Conventional”:
conventional tillage, furrow irrigation, winter wheat, sidedress N application
- “Integrated”:
reduced tillage, subsurface drip irrigation, winter grain cover crop, fertigation





Other tests of ACR fertilizer protocol

- **Delta Institute**
 - Real-world testing of two fertilizer protocols in IL, MI and OK
 - Efficient aggregation, data management, V/V, registration
- **Chesapeake Bay Foundation**
 - Region-specific, user-friendly version of DNDC
 - Test N₂O benefits of soil testing/adaptive management, manure injection, and variable rate technology
- **The Fertilizer Institute**
 - Evaluate 4R nutrient stewardship for GHG offsets
 - Test ACR, MSU, and Alberta protocols on corn/soy in IA and IL
- **New England Farmers Union**
 - Potatoes, silage and sweet corn in New England



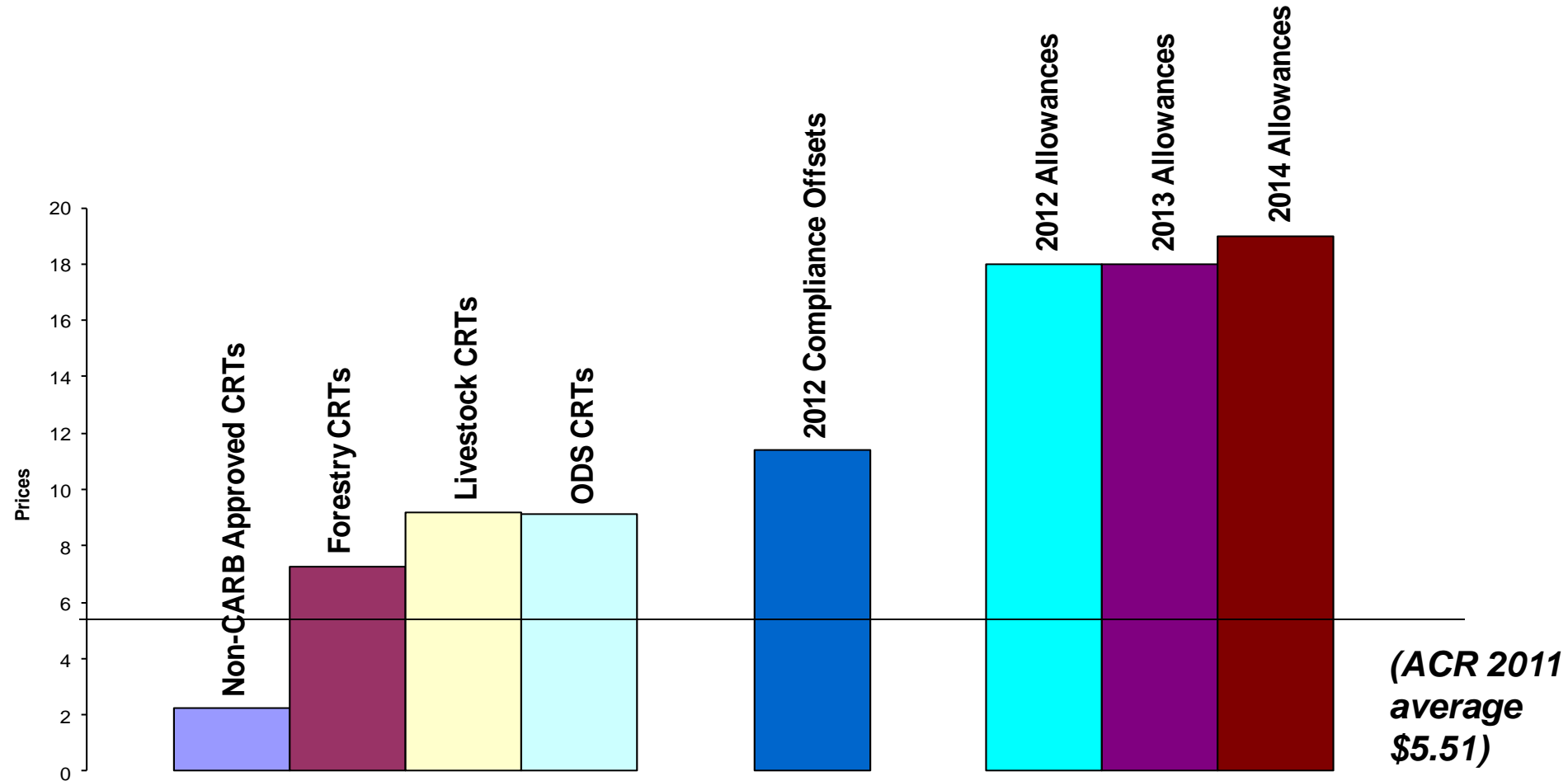
Challenges of standardized additionality and baseline setting

- Standardized approaches good where feasible; may not want to eliminate option of project-specific
- What works for additionality test may not work for baseline setting
- Positive list / deemed add'l useful but what if not binary choice? Or multiple practice changes implemented together?
- What is “right” threshold for adoption rate?
- Output-based intensity metrics possible for add'l and baseline setting?
- How to reward early adopters, still incentivize “laggards,” and maintain environmental integrity?
- Projects with multiple benefits / revenue streams should not be excluded
- Appropriate intervals for updating adoption rates
- Need for temporal flexibility across crediting period

ARB adoption of compliance offset protocols in agriculture

- ARB on Aug 24, 2011 announced fertilizer and rice protocols will be taken to Board in 2012
- Most analyses show offset supply is short
 - Fertilizer: 0.5 MMT/y California, 20 MMT/y U.S.?
 - Rice: 0.2 MMT/y California, more from Midsouth
 - But this supply will take a long time to materialize
- Lot of interest in N₂O from agriculture
 - State agencies have funded \$2.5 million in research on N₂O baselines, mitigation measures, DNDC applications
- ARB likely will design own protocols, building on ACR, CAR etc.
 - Pilot testing in CA and beyond will be key to inform protocol design
 - Recognition of early action protocols / projects?

Pricing (\$/metric ton)





Further information

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