

Climate Action Reserve's Agriculture Protocol Program



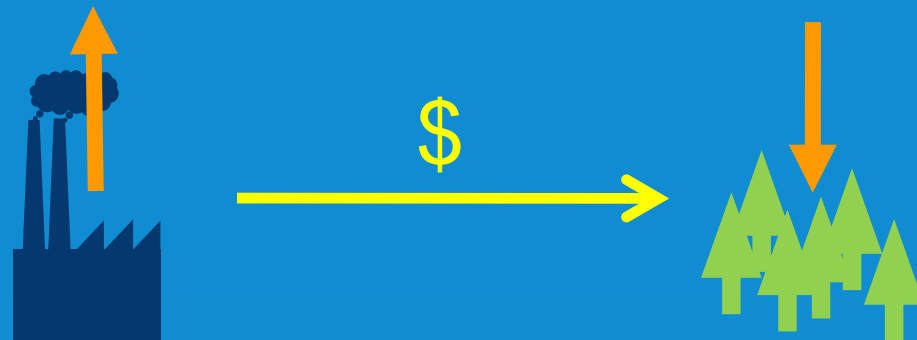
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USDA Agriculture Air Quality Task Force Meeting
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What Is A GHG Offset?

- *General:* A reduction in GHG emissions (or increase in C sequestration) achieved to compensate for emissions somewhere else
- *In a Carbon Market:* A permit to emit greenhouse gases issued when a reduction is achieved at an *unregulated* source





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Ensuring Integrity of Offsets

- Real
 - It is not an artifact of inaccurate or incomplete accounting
- Additional
 - Not required under a regulation
 - Would not happen without the incentive of the GHG market
- Permanent
- Verifiable
- Enforceable



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US Carbon Market Context

- Voluntary Markets
 - Support climate neutral claims
- Compliance Programs
 - Provide economic efficiency, price pressure relief
 - Reduce more emissions faster
 - Current and planned compliance programs
 - Regional Greenhouse Gas Initiative – operational since 2009
 - California Cap and Trade – planned for 2012
 - Western Climate Initiative – first phase planned for 2012
 - National cap and trade eventually

Background on the Climate Action Reserve



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- Chartered by California state legislation in 2001
 - Mission is to encourage early actions to reduce emissions and to have such emissions reductions recognized
 - Initially focused on emission reporting and reductions by member organizations in California
 - Now a North American program focused on emission reduction projects generating offsets
- Balances business, government, academic, and environmental interests



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What We Do

- Develop High Quality Standards
 - Convene stakeholders and lead development of standardized protocols for carbon offset projects
- Manage Independent Third Party Verification
 - Training and oversight of independent verification bodies
- Operate a Transparent Registry System
 - Maintain registry of approved projects
 - Issue and track serialized credits generated by projects



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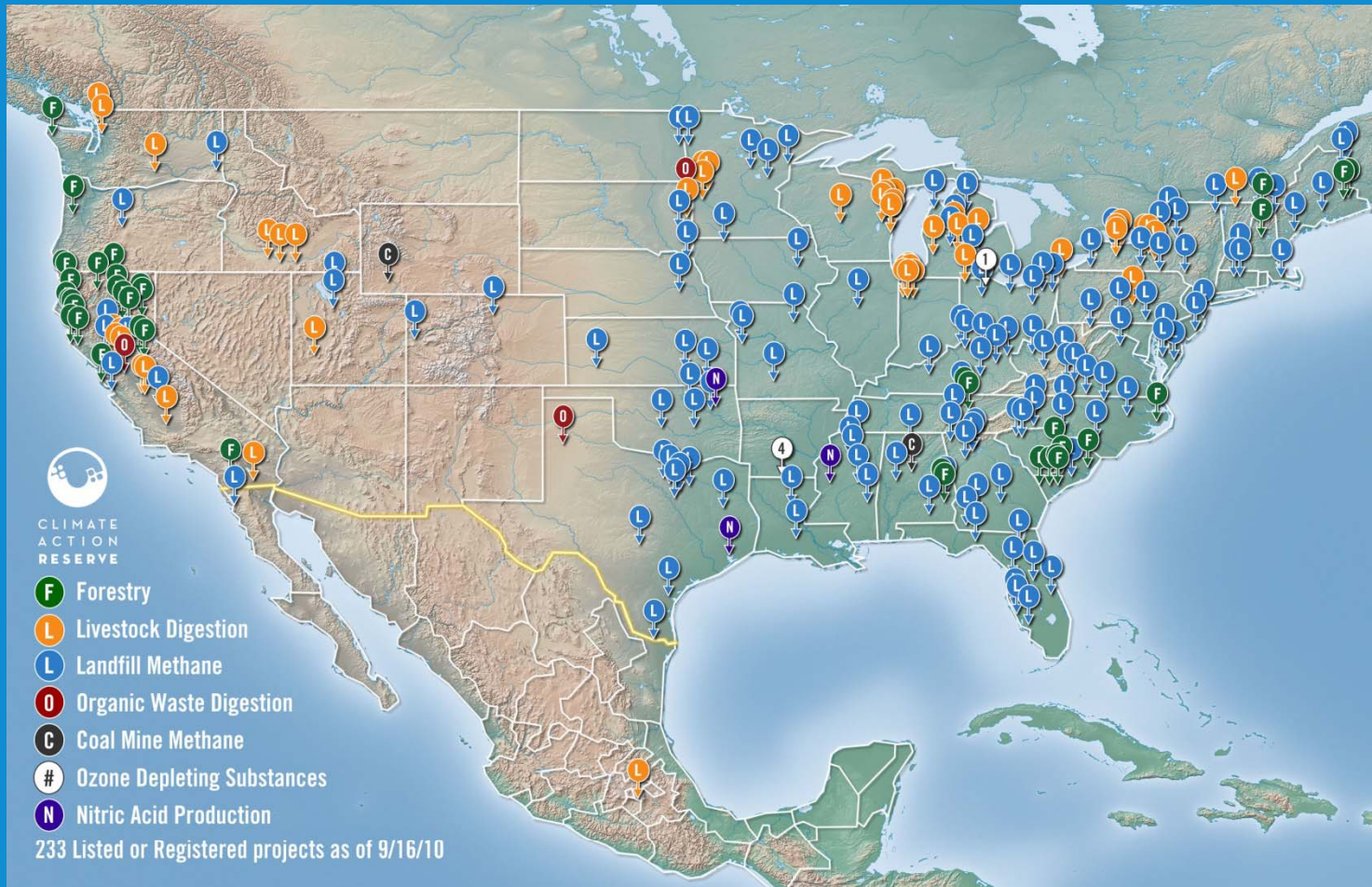
Existing Protocols

- Forestry
 - Improved Forest Management
 - Reforestation
 - Avoided Conversion
- Urban forestry
- Landfill gas capture (US & Mexico)
- Livestock methane capture (US & Mexico)
- Organic waste digestion
- Organic waste composting
- Coal mine methane
- Nitric acid production
- Ozone depleting substances (US & Article 5 sources)

Listed and Registered Projects



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Reserve Stats

- Over **7 million CRTs** registered
 - CRT = “Climate Reserve Ton” = 1 metric ton
- **365 Projects** in the system
 - Projects listed: **171**
 - Projects registered: **62**
 - New projects (not shown on map): **132**



Protocol Development Goals

- Develop a standardized approach for quantifying, monitoring and verifying GHG reductions
 - Research industry trends in adoption of GHG reducing practices
 - Set criteria and reference points based on industry trends
 - Provide specific tools for quantifying emissions
 - Detailed and specific monitoring requirements
 - Train verifiers with a consistent set of protocol-specific standards
- Maintain consistency with or improve upon existing methodologies
- Balance accuracy, conservativeness, and practicality



Protocol Development Process

1. Internal research and scoping
2. Public scoping meeting(s)
3. Multi-stakeholder workgroup formation
4. The Reserve drafts a preliminary protocol
5. Draft protocol considered by workgroup
 - Provides technical expertise and practitioner experience
 - Period meetings and individual consultation when needed
6. Revised draft protocol released for public comment
7. Public workshop(s)
8. Final version adoption by Reserve board in public session



Agriculture Protocols Scoping and Early Outreach

- Participated in agriculture experts meetings
- Published issue paper, *Soil Carbon Sequestration with Biochar*
- Systematically evaluated protocol readiness for agriculture project types
- Presented to key stakeholder groups and at scientific/technical meetings



Agriculture Protocols Scoping Criteria and Ranking

- US GHG mitigation potential
- Availability of vetted quantification options that are good estimators of emissions
- Availability of data on common practice
- Risk of reversals (high risk = low ranking)
- Potential yield impacts (high risk = low ranking)
- Potential environmental impacts
- Cost per ton and other barriers (high risk = low ranking)



Agriculture Protocols Internal Scoping Outcomes

<u>Category</u>	<u>Ranking</u>
Cropland management	1
Nutrient management	2
Restoration of degraded lands	3(t)
Establishing aboveground woody biomass	3(t)
Rice management	5
Cropland/Grassland land use change – mineral soils	6
Cropland/Grassland land use change – histosol soils	7(t)
Livestock feed management	7(t)
Grazing land management	9
Productivity improvements	10

Cropland Management Potential Project Activities



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Practice	Mitigation Rate (t CO ₂ e/ha/yr)	Total Potential (Mt CO ₂ e/yr)
Use winter cover crops	1.71	113.60
Conventional to no till	1.12	107.30
Conventional to conservation till	1.23	95.50
Diversify annual crop rotations	0.66	79.70
Include perennial crops in rotations	1.03	57.70
Change from annual to perennial crop	2.67	32.90



Rice Management Potential Project Activities

- Methane reduction may occur with changes in:
 - Water management
 - Drill (dry) seeding
 - Mid-season drainage
 - Minimizing or discontinuing practice of winter flooding
 - Other possibilities
 - Residue management
 - Alternative residue disposal
- US mitigation potential 1.5 – 4.5 Mt CO₂e/yr



Nutrient Management Potential Project Activities

- Reduce N₂O emissions *without loss of productivity* by:
 - Optimizing N application rate
 - Changing N source
 - Changing timing of N application
 - Changing placement of N application
- Mitigation potential of 62.8 Mt CO₂e per year
- Broadly applicable to regions and cropping systems



Key Issues

- Practical and accurate estimation of GHG reductions
- Data for performance standards
- Risk of reversals
- Avoiding yield impacts
- Start date policy and early action
- Interrelationship among practices
- Regional variation in opportunity
- Need for flexibility



Estimation Tools

- Field sampling
 - Soil measurement
 - Gas flux measurements
- Process models
 - Daycent/Century
 - DNDC
- Empirical models and emission factors
 - Bouwman et al
 - Milllar et al



Potential USDA Data Sources for Baselines and Benchmarks

- NRCS Natural Resources Inventory
 - Tillage surveys
 - Fertilizer surveys
- National Soil Survey
 - Existing data on soil organic matter content at regional scales
 - “Rapid Assessment” underway, links soil carbon to land use and management, smaller spatial scales
- ARS GRACEnet research
 - Determining net GHG emissions from agricultural management systems



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Further Solutions to Explore

- Approaches to ensuring permanence
- Aggregation guidelines/requirements
- Project-specific performance evaluation
- Regional approaches
 - California is unique: leading producer of specialty crops, with diversity of crop rotations and management systems, mostly irrigated
 - Rice is produced in 3 regions spanning seven states
 - Well-developed N₂O emission factors only apply to corn in Michigan
 - Models need to be calibrated for each region and system, impacting availability
- Modularizing protocols where relevant



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Public Scoping Meetings

- October 6: Chicago, IL
 - In conjunction with X-AGG summit
- October 19: Modesto, CA
 - Stanislaus County Office of the California Farm Bureau Federation
- October 27: Washington, DC
 - Hall of the States



Protocol Development Timeline

	Rice Cultivation	Cropland Management	Nutrient Management
Protocol Drafting Starts	October 2010	October 2010	March 2011
Workgroup Formation	November 2010	November 2010	April 2011
Duration of Drafting	7 months	11 months	8 months
Consideration by Board	August - September 2011	February – March 2012	February – March 2012



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Project Sizes

