CLIMATE ACTION RESERVE

Nitrogen Management Project Protocol v2.0

Workgroup Meeting 1

August 29, 2017

Agenda

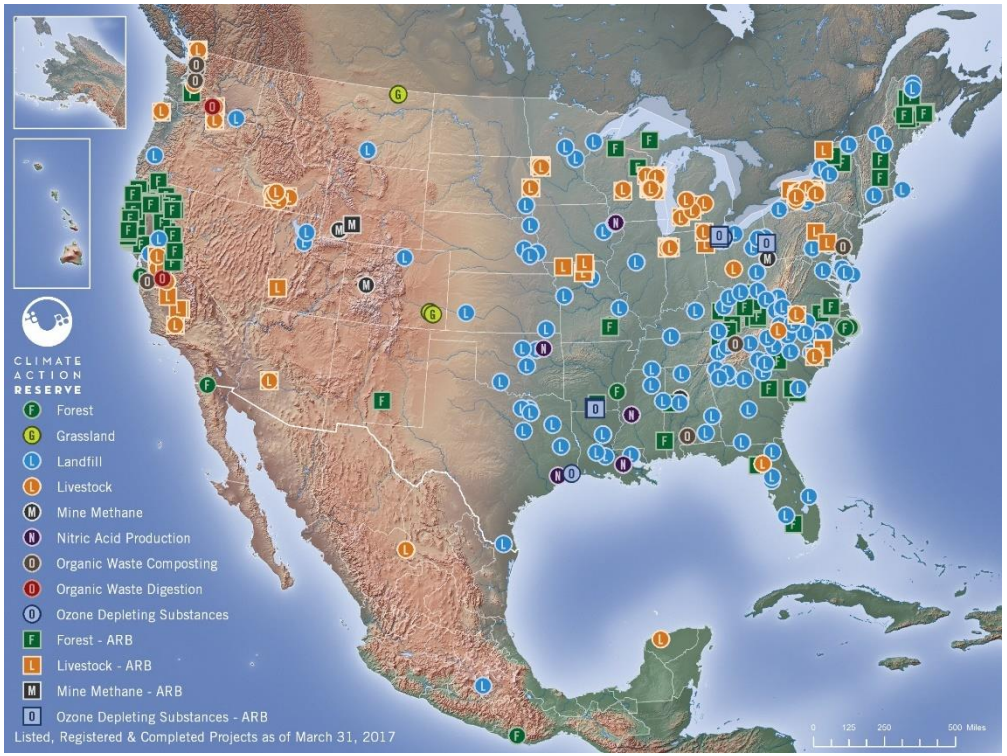
1. Background (5 min)
2. Introductions (10 min)
3. Process Overview (5 min)
4. Areas of Improvement for NMPP v2.0, with discussion as we go (50 min)
   - Start Date, Baseline Scenario, Performance Standard Test, Verification, Aggregation
5. Open forum for feedback and suggestions (15 min)
6. Next steps (5 min)

Section 1

BACKGROUND

Climate Action Reserve

- Private, nonprofit carbon offset registry, founded in 2001:
  - Develop carbon offset policies and protocols
  - Manage a registry of voluntary offset projects
  - Oversee independent verification program
  - Accredited Offset Project Registry for California Air Resources Board
- 18 different project protocols for U.S. and Mexico
- >99M offset credits issued, both voluntary and compliance (CA)



Criteria for offset quality

CLIMATE ACTION RESERVE

Program Principles

- Real
- Additional
- Permanent
- Verified
- Owned Unambiguously

Accounting Principles

- Relevance
- Completeness
- Consistency
- Transparency
- Accuracy
- Conservativeness

Background – NMPP

- **June 2012**: NMPP v1.0 adopted
- **January 2013**: NMPP v1.1 released (current version)
- Uses a modified version of the MSU-EPRI empirical emission factor-based Tier 2 methodology for N-rate reductions
- Developed with the intention to be expanded in a modular fashion adding new quantification methodologies (QMs) for new regions, crops, and practices as sufficient data become available
- No projects have been registered to date
- **2013-2014**: Scoped potential expansion, but was not pursued
- **Currently**: Launching a significant revision and expansion with the generous support of the USDA NRCS, under the Conservation Innovation Grant (CIG) program (part of the EDF-led Nitrogen CIG)

Background – NMPP

- Project Definition
  - The adoption and maintenance of an *approved project activity* that reduces N_2O emissions
  - Applicable only to nitrogen rate (N-Rate) reductions on Corn crops in the North Central Region (NCR)
- GHG Assessment Boundary
  - Primary effects
    - direct and indirect N_2O emission reductions
  - Secondary effects
    - Leakage
    - CO_2 emissions associated with fossil fuel consumption

Section 2

INTRODUCTIONS

Reserve Staff

- Trevor Anderson, *Policy Associate*
  - Protocol development lead
- Sami Osman, *Senior Policy Manager*
  - Assistance with protocol development
- Heather Raven, *Senior Project Coordinator*
  - Coordinate the development process

Workgroup Members

Name (alphabetical)	Organization
Tom Bruulsema	International Plant Nutrition Institute (IPNI)
Sally Flis	The Fertilizer Institute (TFI)
Ritwick Ghosh	Cornell University
Noel Gurwick	U.S. Agency for International Development (USAID)
Alastair Handley	Carbon Credit Solutions Inc.
Richard Kennedy	Climate Smart Group
Dave Lundberg & Jim Pollock	Veri6 Inc
Neville Millar	Michigan State University (MSU)

Workgroup Members

Name (alphabetical)	Organization
Meredith Niles	University of Vermont
Robert Parkhurst	Environmental Defense Fund (EDF)
Jessica Rudnick & Mark Lubell	UC Davis
Richard Scharf	Environmental Services, Inc.
Peter Turner	Stanford University
Michael Wara	Stanford University
Hannah Waterhouse	UC Davis
Peter Weisberg	The Climate Trust

Contractor & Quantification Methodology Development

- Mark Easter Consulting, LLC (Colorado State University)
- Developing new quantification module based on the latest USDA entity scale methods (Eve et al. 2014) for quantifying N2O emissions and emission reductions
  - In Design/Initial Modeling Phase
- **Regions** – Contiguous US, with focus on NCR, Northern Plains, and California
- **Crops** – Major field crops plus tomatoes
- **Practices** – N-Rate Reductions, Nitrification Inhibitors, Slow-Release Fertilizers
- More complete GHG accounting (N residue, tillage practices, cover crops)

Section 3

PROCESS OVERVIEW

Protocol development timeline

This schedule is preliminary and subject to change

Milestone/Task	Timeline
Technical Contractor begins work	Aug 1, 2017
Staff work with contractor	Aug – Dec 2017
1st WG meeting (webinar) – technical elements	Aug 29, 2017
Staff protocol drafting	Sep – Dec 2017
2nd WG meeting (webinar) – quantification methodology	Sep – Oct 2017
Draft protocol to Workgroup	October 2017
3rd WG meeting (Los Angeles) - draft protocol	Oct – Nov 2017
WG comment on draft protocol	Oct – Nov 2017
Revised protocol & start of 30-day public comment period	Nov – Dec 2017
Final protocol adoption by Reserve Board	Jan 2018

Workgroup expectations

- Attend and participate in WG meetings to the fullest extent possible
- Attend in-person meeting in Los Angeles
  - Once draft protocol is ready for WG review
- Provide feedback on specific policy and technical questions
  - At WG meetings, one-on-one with staff, or in sub-committees
- Provide comments on draft protocols and protocol sections
- Be constructive, collaborative, and productive

Protocol development overview

- **GOAL**: To develop a simple and workable protocol with an expanded scope (i.e., applicability to more regions, crops and practices) that maintains a high-level of scientific credibility, incentivizes improved nitrogen management and N_2O emission reductions, and succeeds in getting projects implemented

Section 4

AREAS FOR IMPROVEMENT

Start Date

- NMPP v1.1:
  - First day of a new cultivation cycle – the first day after the field's previous harvest of a primary crop was completed for that crop
  - *No more than **six months** prior to submission*
- **NMPP v2.0 Proposal:**
  - Change to *No more than **twelve months** prior to submission*
    - Wider window; Aligns with cultivation cycle
    - Aligns with WCI Criteria for Eligibility Date
    - *Still able to readily claim projects are implemented based on incentives from offset credits?*
    - *Still protects against entity misrepresenting baseline?*

Baseline

- Reference case that best represents the conditions most likely to have occurred in the absence of the GHG project
- NMPP v1.1:
  - *Annual Baseline N Rate* = Average N Rate over the Baseline Look-Back Period
  - *Baseline Look-Back Period* = All Eligible Crop Years over the 5 Years Prior to Start Date; extend to include at least 3 years
  - *Eligible Crop Year* = 1 Complete Cultivation Cycle in which an Eligible Crop is Grown on the Field
  - Requires historical fertilizer (synthetic & organic) application records for at least the past 5 years prior to start date
  - The crop production system on a *project* field must be consistent with the past 5 years of management data

Baseline

- NMPP v2.0 Considerations:
  - New Eligible Crops & Eligible Crop Years
    - Maintain and establish Baseline Look-Back Period for each individual eligible crop in *project* field
    - *How far to look back into historical management? Suffice to shorten period to 3 years for each eligible crop?*
  - Implement Hierarchy of Approaches to Selecting Baseline
    1. Historical Records (as in NMPP v1.1)
    2. *MSU-EPRI Approach 2*
       - » No/Insufficient records available
       - » Growing eligible crop in *project* field not recently grown

MSU-EPRI Approach 2

- In the absence of records, baseline N fertilizer rate is calculated from crop yield data at the county level from USDA NASS and equations for determining N fertilizer rate recommendations based on yield goal estimates
  - Equations found in state department of agriculture and land grant university agriculture department documents
  - Are these resources readily available to farmers in *all eligible regions*, *for all eligible crops*?

Performance Standard Test

- Meeting performance threshold to demonstrate additionality
- NMPP v1.1:
  - **Practice**: Reducing Nitrogen Application Rate
  - Ratio of **R**emoved **T**o **A**pplied Nitrogen (**RTA**)

$$RTA_f = \frac{(Y_f \times NC)}{NR_{P,f}}$$

    - Y = *Average* Historical Yield over *Baseline* Look-Back Period (at least 3 eligible crop years); Fixed for *Crediting Period* (CP)
    - NC = Default N concentration (for corn grain/silage)
    - NR = *Annual* N Application Rate during *Reporting Period* (RP)
  - **PASS**: Farmer's Annual RTA each RP > State Average RTA
    - State Y from NASS; State NR from ARMS

Performance Standard Test

- Issues with RTA:
  - Not straightforward/intuitive
  - Considerable variability from Farm to State Level
  - Considerable variability in yield from year to year
- Potential Issues with Performance Standard Test:
  - *Grace Period* – for first two eligible crop years to meet or exceed the applicable RTA performance threshold
    - *Would this be allowed by California Air Resources Board (ARB)?*

Performance Standard Test

- **NMPP v2.0 Proposal**:
  - **Practice**: Reducing Nitrogen Application Rate
  - Replace RTA with simple **N**itrogen **U**se **E**fficiency (**NUE**) metric:
    - **NUE** = **P**artial **F**actor **P**roductivity of Applied Nutrient (**PFP**)
    - **PFP** = Harvested Crop Yield (Y) / Amount of Nutrient Applied (F)
  - Calculate for each Eligible Crop each Eligible Crop Year in RP
  - Estimate at smaller scale than State
  - Considering Two Options to **PASS**:
    1. Exceed County Average NUE
    2. Demonstrate Improved NUE Performance

Performance Standard Test

1. County Average NUE Comparison:
   - PASS: Annual PFP each RP > County Average PFP
     - Annual PFP = RP,Y / RP,F
     - County Avg. PFP = County Avg. Y / County Avg. F
     - County Avg. Y = County-Level Yield Data from NASS
     - County Avg. F to be estimated the following ways:
       1. Using County-Level Farm Fertilizer Inputs (lbs N / Cropland acre) from IPNI's *Nutrient Use Geographic Information System* (NuGIS) (see worked example)
       2. MSU-EPRI Approach 2
       3. Other Options?

Performance Standard Test

1. Estimating Average County-Level, Crop-Specific F:
   - Data Sources:
     - **NuGIS**: Farm Fertilizer Input per County (lbs N/Cropland acre/county)
       - 21 Crops make up “Cropland”; Annual Data – 2010-2012
     - **NuGIS** *or* **NASS**: Total Planted Acreage per County (planted acres/county)
     - **NASS**: Planted Acreage for Crop per County (planted acres/crop/county) through 2016
     - **ARMS**: Acres Treated with N per State (Percent of Planted Acres/Crop/State) = DEDUCTION FACTOR
   - Develop and update look-up database

Worked Example Calculation

- Average County-Crop-Specific **F** =
  1. Estimate Total Amount of Nitrogen Applied (lbs) in County:
     - Multiply Fertilizer Input per County (lbs N/Cropland acre) x Total Planted Acres per County (Cropland acres)
  2. Estimate Nitrogen Applied per Specific Crop (lbs N/acre) in County:
     - Divide Total Nitrogen Applied in County (lbs N) (1) by Crop-Specific Planted Acres in County (Crop-specific acres)
     - Assumes every crop-specific planted acre is treated with N
  3. Apply Deduction Factor:
     1. Multiply (2) by applicable Percent of Crop-specific Planted Acres Treated with N in applicable State

Worked Example Calculation - 1

- Y = 145.8 bu/acre = 8164.8 lbs/acre
- Estimating **F** for Corn in Lancaster County, Nebraska in 2010:
  1. 72.95 lbs N/cropland acre (from NuGIS) x 265,000 planted acres (sum of planted field crops from NASS) = 19,331,750 lbs N
  2. 19,331,750 lbs N / 128,600 (planted acres of corn from NASS) = 150.32 lbs N / corn acres (assuming 100% planted corn acres are treated with N)
  3. 150.32 lbs N / corn acres x 96.4% (from ARMS) = 144.9 lbs N /acre
- PFP = (8164.8 lbs/ac) / (144.9 lbs/ac) = 56.35

Performance Standard Test

2. Demonstrate NUE Improvement:
   - PASS: Annual PFP each RP > Historical Average PFP
     - Annual PFP = RP,Y / RP,F
     - Historical Avg. PFP = Historical Avg. Y / Historical Avg. F
     - Historical Avg. Y = Historical Yield
     - Historical Avg. F = Historical Fertilizer Use
   - *Recalculate Historical Average PFP each RP?*
   - *If no or insufficient records are available, and/or growing eligible crop in project field not recently grown, use MSU-EPRI Approach 2 to estimate Historical F (i.e., Baseline F)*

Performance Standard Test

- NMPP v2.0 - New Approved Project Activities
  - Nitrification Inhibitors
    - Data available from ARMS – low rate of adoption
    - Applicable to all Crop types, particularly Cotton?
      - ICF 2016 Report - *Managing Agricultural Land for Greenhouse Gas Mitigation within the United States*
  - Slow-release Fertilizers
    - Comprehensive national data unavailable
- **Proposal***: Nitrification Inhibitors and Slow-Release Fertilizers exceed common practice and are additional by default if applied in Project*

Verification

- Systematic, independent and documented process for the evaluation of a GHG assertion against agreed criteria
- NMPP v1.1
  - Requires Corn Stalk Nitrate Tests (CSNT)
    - Single-Field Projects – CSNT results are used to assess risk of whether the project activity has occurred
    - Aggregates – CSNT results directly inform risk-based sampling for verification site visits
    - Costly, time-consuming
    - CSNT is not doing what we want, but need *evidence* to verify the farmer's N-rate applications

Verification

- NMPP v2.0 Considerations:
  - Eliminate CSNT requirements
  - Request and review fertilizer application records, receipts, inventories, as-applied maps, soil or tissue tests results, time-stamped photographs, etc.
    - Consistent with requirements of other protocols
    - Leverage reporting requirements associated with existing regulations (e.g., CA Water Resources Board Irrigated Lands Regulatory Program)?
  - Require agronomic expert on verification team
  - Other Ideas?

Aggregation

- Project comprised of 2 or more fields
- NMPP v1.1:
  - Field Size Limits
    - No limit on total number of acres; limits on max. acreage/field
  - Uniform Reporting Period (RP)
    - Emission reductions (ERs) from each field are prorated
  - Site Visits
    - Risk based and random sampling approaches
    - Prioritize based on CSNT results that indicate “excessive” N use
    - Small aggregates, large single-participant aggregates, large multi-participant aggregates

Aggregation

- NMPP v2.0 Considerations:
  - Remove Field Size Limits
  - Uniform RP – *concerns around prorating approach?*
  - Site Visit Requirements
    - ARB implications
  - "Administrative Aggregation"
    - At least streamline paperwork
  - Terminology – *rephrase "aggregate"?*

Section 5

FEEDBACK AND SUGGESTIONS

Section 6

NEXT STEPS

Next Steps

- Submit comments/feedback by Friday 9/8
- Staff and contractor work on technical issues and protocol drafting
- 2nd WG Meeting (QM Discussion) – end of September – start of October
- 3rd WG Meeting (IN-PERSON) – end of October – start of November

Contact Information

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Worked Example Calculation - 2

- Y = 43.6 bu/acre = 2616 lb/acre
- Calculating **F** for Soybean in Lancaster County, Nebraska in 2010:
  1. 72.95 lbs N/cropland acre x 265,000 planted acres = 19,331,750 lbs N
  2. 19,331,750 lbs N / 130,300 (planted acres of soybean from NASS) = 148.36 lbs N / soybean acre (assuming 100% planted soybean acres are treated with N)
  3. 148.36 lbs N / corn acres x 31.9% (from ARMS) = 47.32 lbs N / soybean acre
- PFP = (2616 lb/ac) / (47.32 lb/ac) = 55.28