Discussion of New Compliance Offset Protocols for the Cap-and-Trade Regulation

California Air Resources Board
March 28, 2013

Webcast Information

- Slides posted at:

  http://www.arb.ca.gov/cc/capandtrade/meetings/meetings.htm

- E-mail questions to:

  auditorium@calepa.ca.gov

Agenda

- Cap-and-Trade Status Update
- Offset Program Status Update
- Verifiers and Verification Bodies
- New Protocol Development
  - Criteria
  - Timeline
  - Early Action
- Rice Cultivation Protocol
- Coal Mine Methane Protocol

Cap-and-Trade Status Update

- Cap-and-Trade Regulation effective January 1, 2012
- Regulatory Amendments effective September 1, 2012
- Emissions Compliance began January 1, 2013
- Proposed Amendments for Linkage
  - Board hearing scheduled for April 19, 2013
- Investment plan for auction proceeds
  - Board meeting scheduled for April 25, 2013
- Additional Amendments and Offset Protocols
  - Anticipated Board consideration Fall 2013

Offset Program Status Update

- Compliance Offset Projects Listed
  - 3 by American Carbon Registry
  - 1 by Climate Action Reserve
  - Verifications are currently underway
  - First ARB offset credits from compliance offset projects likely issued as early as Summer
- Early Action Offset Projects Listed
  - 25 by ARB
  - Listings updated first Wednesday of each month
  - First regulatory verification received
  - First ARB offset credits from early action projects likely issued this Spring

Verifiers and Verification Training

- Four training sessions were in summer 2012 with attendance of:
  - 78 verifiers
  - 19 Offset Project Registry staffers
  - 6 Offset project operators/consultants
- Scheduled upcoming training:
  - April 22-26, 2013
  - For more information, see:

http://www.arb.ca.gov/cc/capandtrade/offsets/verification/verification.htm

Verifiers and Verification Bodies

- 14 Verification Bodies accredited
- 68 Offset Verifiers accredited
  - 59 Lead verifiers
  - 29 Livestock project specialists
  - 26 U.S. Forest project specialists
  - 25 ODS destruction project specialists
  - 19 Urban Forest project specialists
- For more information, see:

http://www.arb.ca.gov/cc/capandtrade/offsets/verification/verification.htm

New Protocol Development

- New potential protocols
  - Rice Cultivation
  - Coal Mine Methane
- Both potential protocols primarily target methane emissions reduction
- Methane (CH4) facts:
  - 100-year GWP is 21 (AR2)
  - Short-lived gas with a lifetime of 12 years
  - Is the primary component of natural gas

Offset Criteria

- Real, additional, quantifiable, permanent, verifiable, and enforceable
- Board-adopted Compliance Offset Protocols
- Cannot credit emission reduction activities already covered under the cap
  - No offset credits for fossil fuel or electricity displacement
- Must meet the same accuracy requirements as all other reported GHG emissions
- Although participation in the offset program is voluntary, all participants are subject to regulatory requirements, including oversight and enforcement.

Leakage

- Offset quantification methodologies must account for leakage
- What is leakage?
  - Increased GHG emissions that result from the displacement of activities from inside to outside the project's boundary
  - Directly resulting from offset project activity
  - Indirectly due to the effects of a project on an established market
- Leakage is accounted for in two primary ways
  - Direct measurement of project-specific leakage with appropriate deduction from credits issued
  - Application of a standard deduction based on leakage potential

Early Action for New Protocols

- Occurred between January 1, 2005 and December 31, 2014
  - Registered with ARB prior to January 1, 2014
- Results from the use of an approved quantification methodology
  - Voluntary protocols that are substantially similar to the adopted Compliance Offset Protocol will be considered for early action quantification methodologies
- Is verified pursuant to section 95990(f)

New Compliance Offset Protocol Crediting

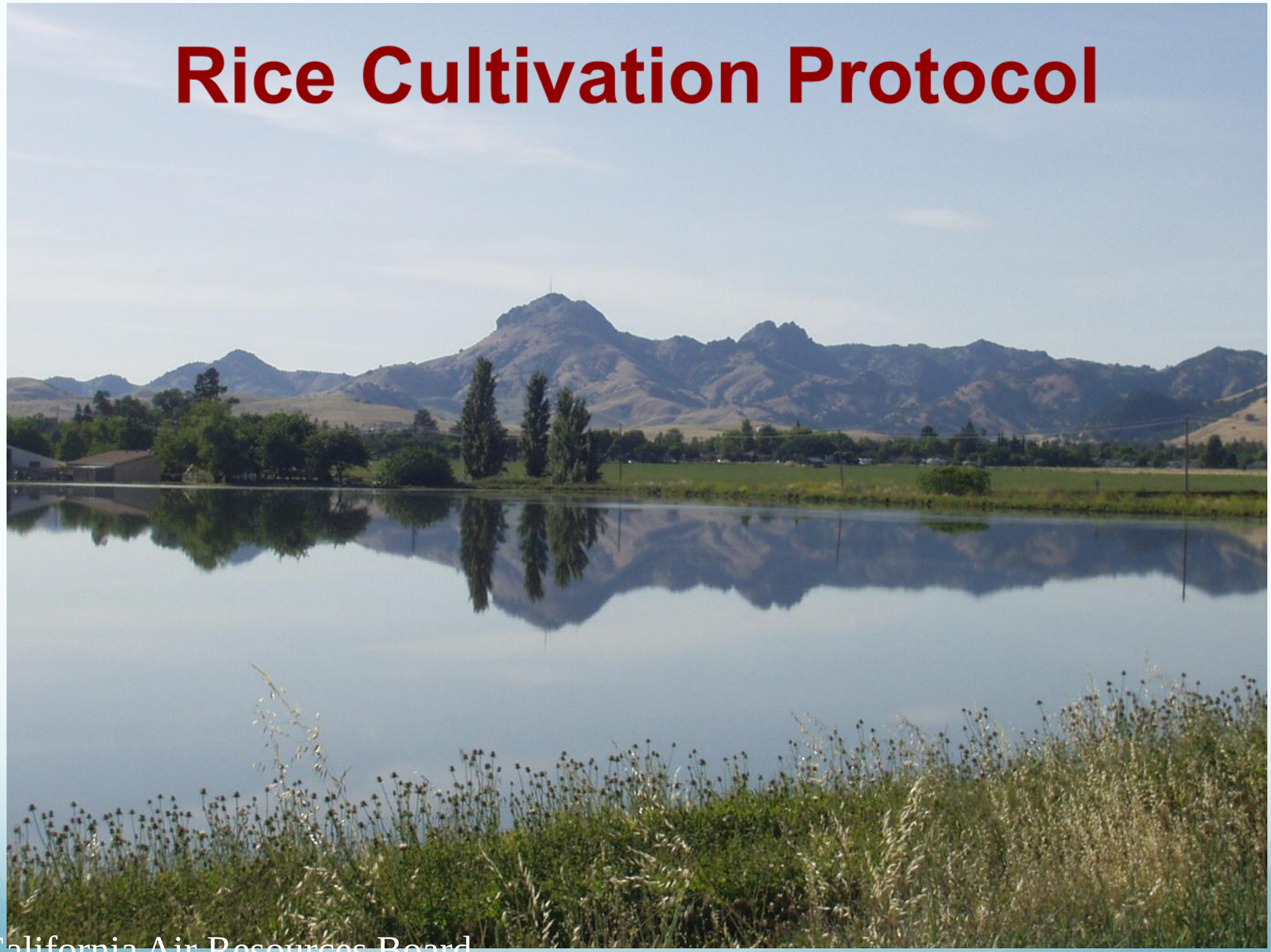
- Project commencement date must be after December 31, 2006
- Project can only be credited for GHG emission reduction up to 28 months prior to listing
  - For example, if a project is listed on June 1, 2014 and the Offset Project Data Report is submitted simultaneously, crediting can begin February 1, 2012

Timeline for New Protocol Development

- Technical working groups: Spring 2013
- Draft protocols for public comment: Summer 2013
- Board consideration: Fall 2013
- Protocol effective date: Spring 2014

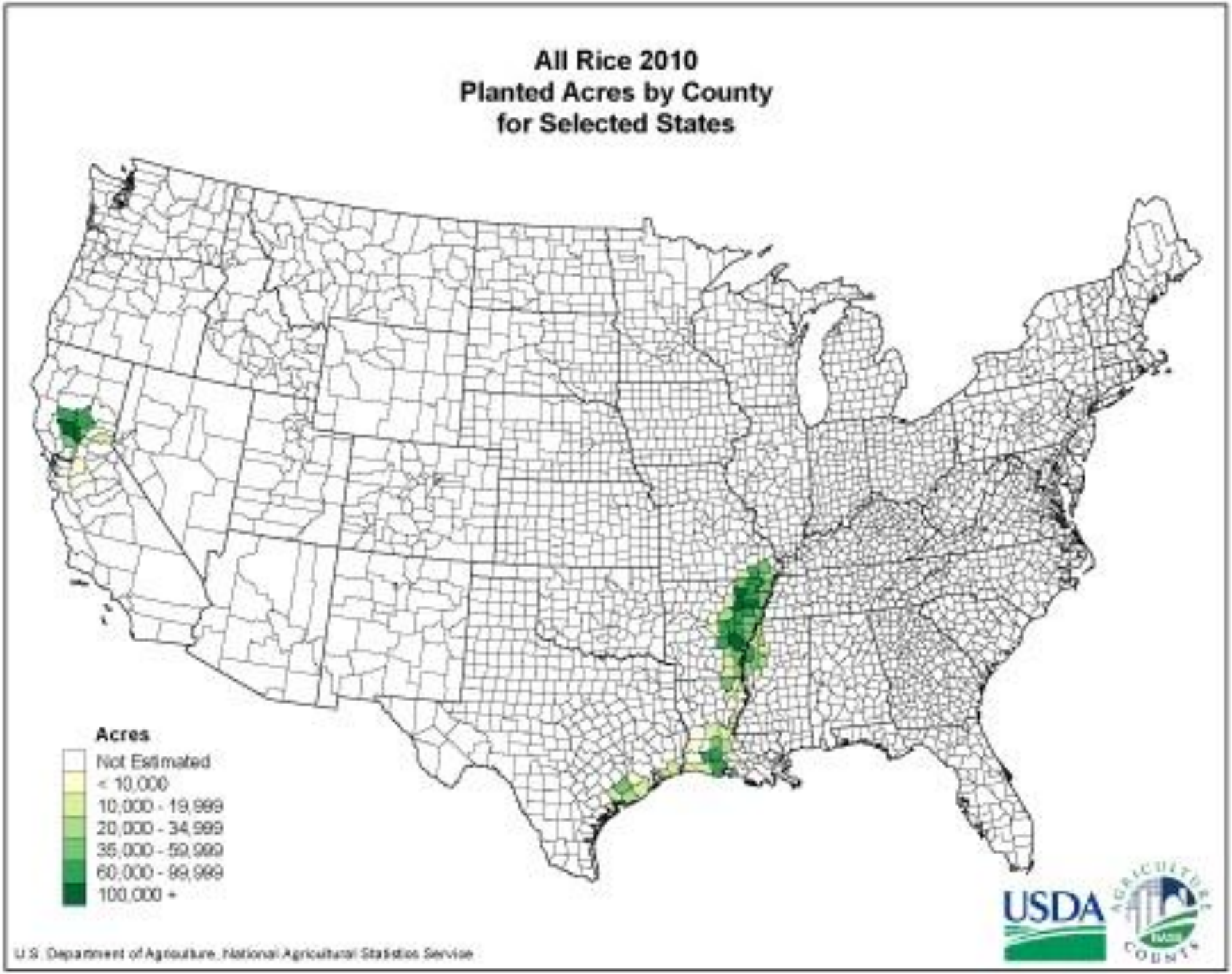
Questions?

Rice Cultivation Protocol



Overview of U.S. Rice Farming Industry

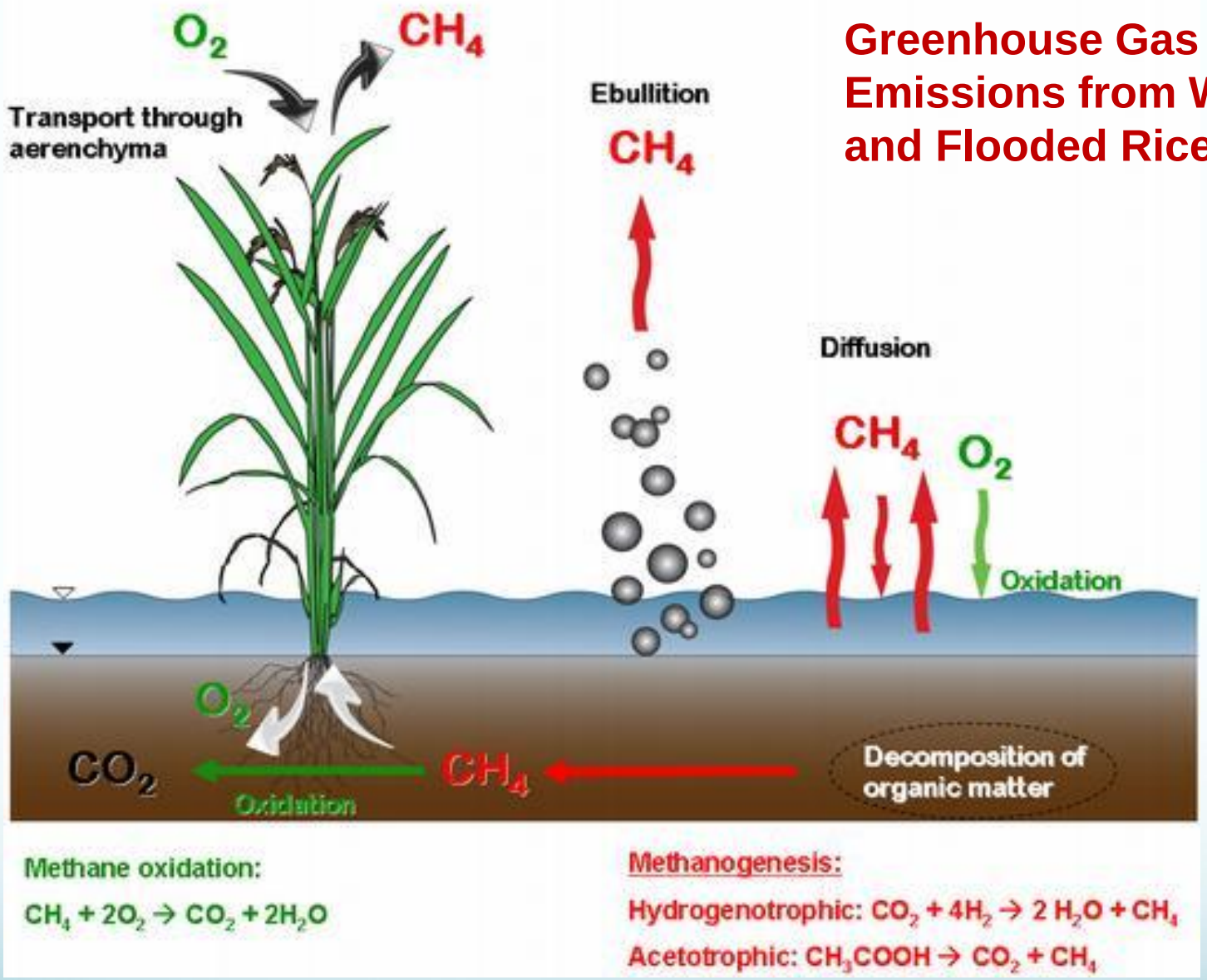
- Rice has been commercially cultivated for over 300 years in the US
- More than 90% of rice consumed in US is grown by US rice farmers
- 6 major rice–producing states: AR, CA, LA, MS, MO, and TX
- Total planting area: 2.6 - 3.5 M acres
- Rice cultivations provides significant economic and ecological value


All Rice 2010
Planted Acres by County
for Selected States
Acres
Not Estimated
< 10,000
10,000 - 19,999
20,000 - 34,999
35,000 - 59,999
60,000 - 99,999
100,000 +
USDA
U.S. Department of Agriculture, National Agricultural Statistics Service

Rice Cultivation Projects Protocol

- First crop-based offset protocol considered by ARB
- Flooded rice paddies serve ecological functions as man-made wetlands; but also a source of GHG emissions
- Protocol quantifies greenhouse gas emissions reductions from rice cultivation practices
- Maintains yield and preserves current associated ecological benefits
- Potential reductions of 0.5 – 3 MMTCO2e thru 2020

Greenhouse Gas Emissions from Wetlands and Flooded Rice Fields



Source: http://www.ibp.ethz.ch/research/environmentalmicrobiology/research/Wetlands

Current Rice Cultivation Protocols in Voluntary Market

- ACR: Voluntary Emission Reductions in Rice Management Systems (May 2011)
  - California regional quantification methodology
  - Adding Mid-South Module to quantification methodology
- CAR: Rice Cultivation Project Protocol Version 1.0 (Dec 2011)
  - California region quantification methodology

Project Definition

- The implementation of approved practices that reduce methane emissions from rice cultivation
  - California
    - Straw removal after harvest
    - Switch from wet seeding to dry seeding
    - Early drainage at the end of growing season
  - Mid-South States
    - Straw removal after harvest
    - Early drainage at the end of growing season
    - Intermittent flooding (alternate wet and dry)
    - Staggered winter flooding

Eligibility Criteria

- Project geographic location
  - California
  - Mid-South
- Project commencement
  - First day of cultivation cycle during which a project activity is implemented
- Project reporting period
  - Cultivation cycle – approximately one year
- Crediting period
  - 7 years

Project Boundary of GHG Sources, Sinks, and Reservoirs

- Soil systems – biochemical reactions affecting GHG emissions
- Increased fossil fuel emissions (outside CA only)
  - CA Fossil fuels will be capped in 2015
  - Field preparation
  - Fertilizer/pesticide/herbicide application
  - Straw handling
- Straw residue usage
- Leakage

Emissions Quantification Methodology

- Soil systems emissions quantified using DeNitrification DeComposition (DNDC) model
  - http://www.dndc.sr.unh.edu/
- A computer model that can be used for predicting emissions of GHGs based on field-specific parameters Calibrated with:
  - Crop-type specific data
  - Region specific data
  - Activity specific data
  - Quantify both baseline and project emissions

Emissions Quantification Methodology (cont)

- Fuel usage emissions quantified using default fuel specific emissions factors and fuel volumes
- Straw residue usage emissions quantified using emissions factors specific to end-usage and mass of straw
  - Includes emissions from bailing
- Leakage emissions quantified using normalized annual average yields within the same geographic region and baseline emissions

Baseline Determination

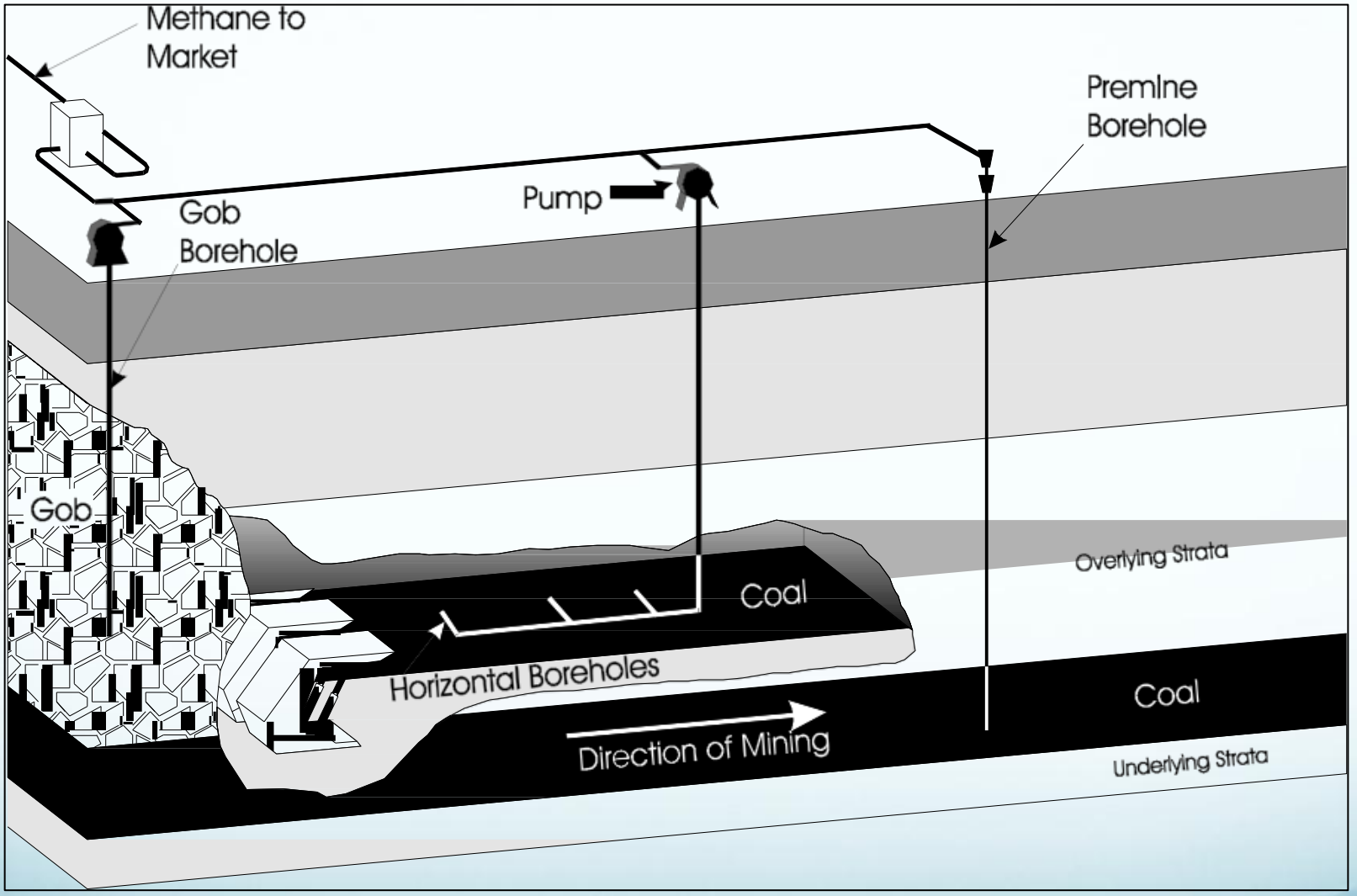
- None of these GHG mitigation practices are widely adopted so none would be considered business as usual
- ARB has not identified any federal, state, or local regulations mandating adoption of any of the identified GHG mitigation practices

Seeking Comments

- Accuracy of DNDC model
- Simplification of DNDC model
  - Use and verification
- Rice specific verification techniques
  - E.g. how to ensure a practice was done
- Project aggregation
  - Methods
  - Risks
- Potential for leakage

Questions?

Coal Mine Methane Protocol

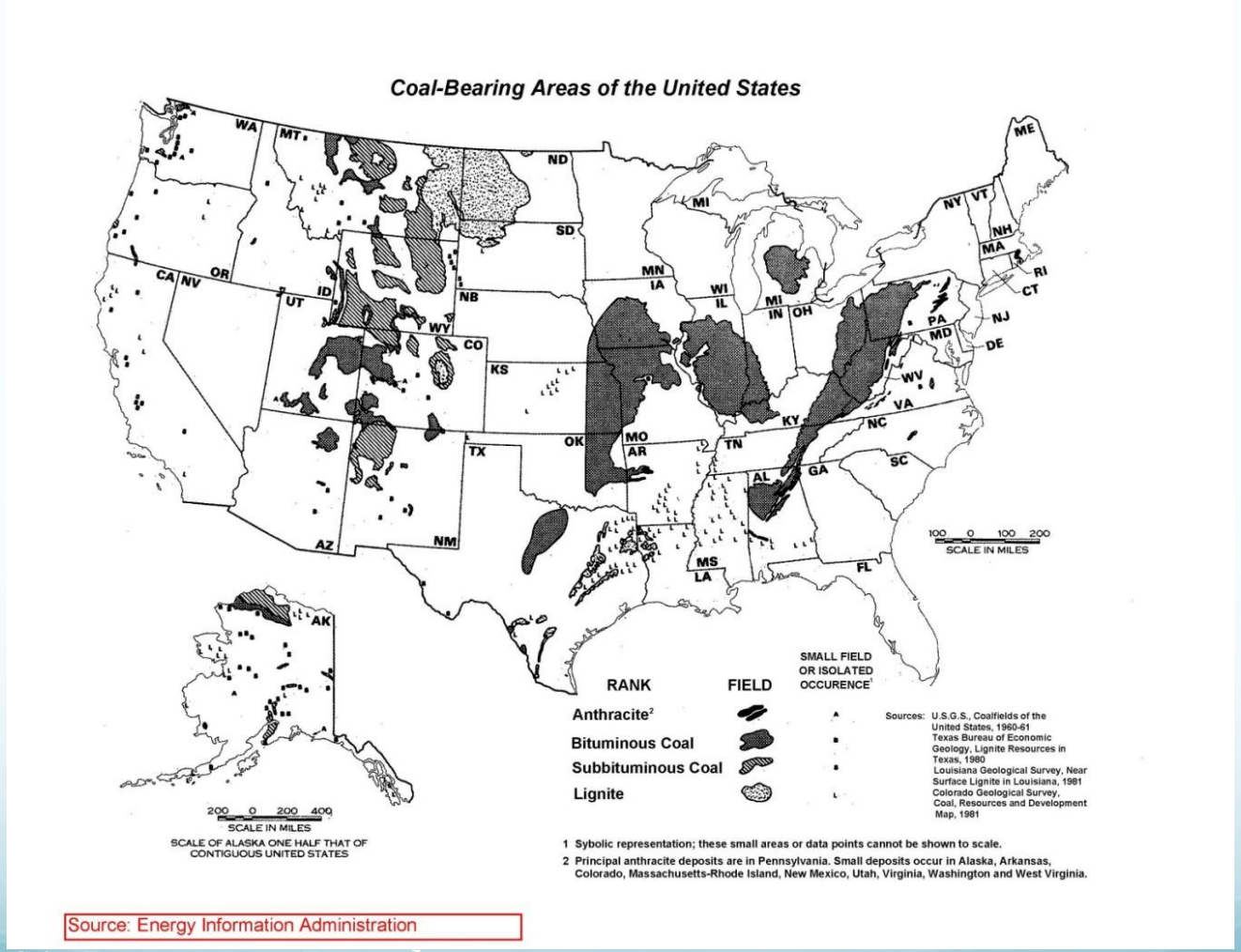


U.S. EPA, *Identifying Opportunities for Methane Recovery at U.S. Coal Mines*, September 2008

Overview of U.S. Coal Mining Industry

- Commercial coal mining began in Virginia in 1748
- Annual coal production roughly 1.1 billion short tons from both surface and underground mines
- About 1/3 of mines are federally owned
  - Mainly in the western U.S.

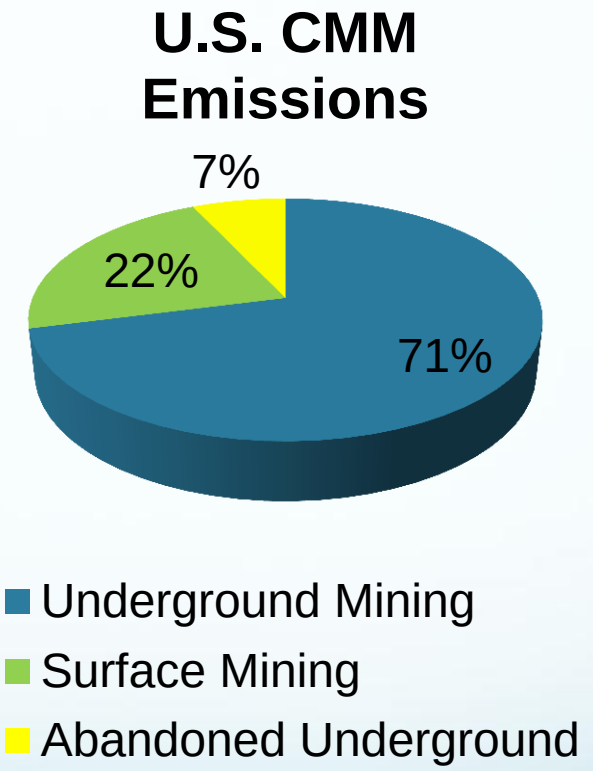
U.S Coal Mining Regions



Source: Energy Information Administration

Coal Mine Methane Projects Protocol

- Methane is released before, during and after mining activities
- 11.6% of all U.S. anthropogenic methane emissions result from coal mining
- Three project types
  - Active underground mines
  - Abandoned underground mines
  - Active surface mines

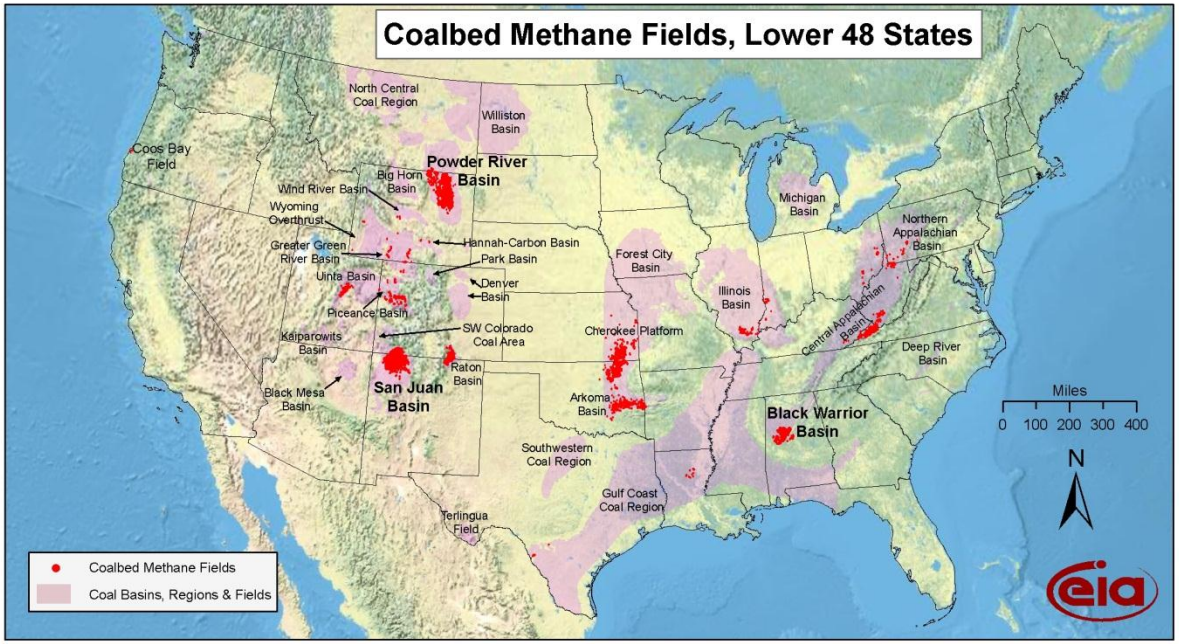


Adapted from data presented in U.S. EPA, *Draft Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 – 2011*

Potential Reduction Estimates

Potential Total Methane Emission Reductions from U.S. Coal Mining through 2020

50-100 MMTCO2e



Source: Energy Information Administration based on data from USGS and various published studies
Updated: April 8, 2009

Coal Mine Methane Protocols in the Voluntary Market

- CAR: Coal Mine Methane Project Protocol (October 2012)
  - Active underground
- VCS: Revisions to CDM consolidated methodology ACM008 version 6 to Include Pre-drainage of Methane from Active Open Cast Mines (VMR001) (March 2009)
  - Active underground and surface
- VCS: Revisions to CDM consolidated methodology ACM008 version 6 to Include Methane Capture and Destruction from Abandoned Coal Mines (VMR002) (July 2010)
  - Active and abandoned underground

Coal Mine Methane Protocols in the Voluntary Market (cont)

- CCX: Coal Mine Methane Collection and Combustion Offset Protocol (August 2009)
  - Active and abandoned underground
  - Excludes Ventilation Air Methane
- ACR: Draft
  - Active and abandoned underground, and surface

Project Definition

- Installation of a device or set of devices associated with the capture and destruction of methane gas that would otherwise be vented into the atmosphere as a result of coal mining activities in:
  - Active underground mines
    - Ventilation Air Methane (VAM)
    - Drainage Systems
      - Pre-Mining Boreholes – surface and horizontal
      - Post-Mining Boreholes

Project Definition (cont)

- Installation of a device or set of devices associated with the capture and destruction of methane gas that would otherwise be vented into the atmosphere as a result of coal mining activities in:
  - Abandoned underground mines
    - Drainage Systems
      - Installation and operation of new wells
      - Continued operation of in-mine boreholes and post-mining (gob) wells drilled during active mining
  - Active surface mines
    - Drainage Systems
      - Pre-Mining Boreholes - vertical

Project Boundary

Project Type	Included Sources
Active Underground Mines	Active Mine Venting Ventilation Air Methane (VAM) Collection VAM Oxidation Collection, Transport, and Processing of Methane Destruction Emissions Onsite Usage Flare Vehicle Operations Offsite usage (pipeline)
Active Surface Mines	Active Mine Venting Collection, Transport, and Processing of Methane Destruction Emissions Onsite Usage Flare Vehicle Operations Offsite Usage (pipeline)
Abandoned Underground Mines	Abandoned Mine venting Collection, Transport, and Processing of Methane Destruction Emissions Onsite Usage Flare Vehicle Operations Offsite Usage (pipeline)

Eligibility Criteria

- Project Location
  - United States
- Project Commencement Date
  - The date at which the device(s) used to capture and destroy coal mine methane becomes operational
- Project Reporting Period
  - 12 calendar months
- Project Crediting Period
  - 10 years

Quantification Methodology

Project Type	Quantification
Active Underground Mines	Metered methane destruction
Active Surface Mines	Metered methane destruction
Abandoned Underground Mines	Lesser of metered methane destruction or decline curve

- Abandoned mines decline coefficients based on either:
  - Mine specific
    - Computational fluid dynamics flow simulation model
    - Mine specific parameters
  - Basin decline coefficients

Spatial & Temporal Boundary – Underground Mines

- Physical boundaries defined by the mine area as permitted by a federal or state agency
- Conservative temporal boundary
  - Emission reductions issued only when a well is mined through
    - Working face intersects or passes the borehole
  - Baseline methane emissions are accounted for in the periods in which the emissions would have occurred
  - CO_2 emissions that result from the destruction of methane are accounted for in the period during which destruction occurs

Spatial & Temporal Boundary – Surface Mines

- Physical boundary defined as all strata above mined seams and strata not more than 130 feet below the base of the lowest mined coal seam
- Conservative temporal boundary
  - Only methane collected from within a physical boundary known as the zone of influence will be eligible for crediting
  - Wells are considered to be in the zone of influence when:
    - Elevated amounts of atmospheric gases are produced, or
    - It is physically bisected by mining activities

Spatial & Temporal Boundary – Abandoned Mines

- Horizontal extent is defined by final mine map submitted upon closure
- Vertical extent must be within the extents of the final mine map and meet the following criteria:
  - Drilled 130 feet or less below the mine seam
  - Gob area up to 525 feet above the mined seam when wells are cased to at least 525 feet above the mined seam
  - Gas from two vertically separated mines cannot be comingled in a wellbore (to avoid cross flow)
- Mines classified by the Mine Safety and Health Administration (MSHA) as permanently abandoned and temporarily abandoned are eligible

Eligible Activities

Destruction / Use Activity	Proposed
Destruction of methane from pre-mining drainage systems (underground and surface mines)	Yes
Destruction of methane from post-mining drainage systems/gob wells (underground and abandoned mines)	Yes
Destruction of methane from ventilation shafts (underground and abandoned mines)	Yes
Destruction of methane through flaring, power generation, and heat generation	Yes
Destruction of methane through injection into gas pipeline	Yes
Displacement of grid-delivered electricity or fossil fuel use outside the project boundary	No
Destruction of coalbed methane not associated with active coal mining activities (also known as virgin coalbed methane)	No
Destruction of methane from mines that use CO_2 or any other fluid/gas to enhance CMM drainage	No
Destruction of methane from mines that employ mountain top removal mining methods	No

Injection into Gas Pipeline
Under Consideration

- ARB is considering making the injection of CMM into natural gas pipeline an eligible end use
  - Productive utilization of captured CMM is preferred
  - Only 14 of 295 active gassy mines in the United States currently inject into a pipeline
- The protocol will not allow for the issuance of credits for emission reductions associated with the displacement of fossil fuels that may result from natural gas pipeline injection

Leakage Potential

- Coal Mine Methane and Leakage Potential
  - Project activities that increase gas drainage capacity could reduce constraints on mining operations resulting in increased coal production.
- The protocol must account for applicable leakage
- Leakage Discount Factor – to be determined through technical working group process

Quantification of CMM Emission Reductions

- Emissions Reductions = (Baseline Emissions – Project Emissions) x Leakage Discount Factor
- Baseline Emissions
  - Methane Destruction
  - Release into Atmosphere
  - Production of Power, Heat or Pipeline Injection
- Project Emissions
  - Energy Use to Capture and Use Methane
  - Methane Destruction
  - Un-Combusted Methane
- Leakage Discount Factor

Seeking Comment and Input

- Projects on federal lands – what is the:
  - Permitting process for mines on federal lands?
  - Relationship between mine operators and federal regulators?
- Ownership of methane – who is Offset Project Operator on:
  - Federal Lands?
  - Private Lands?
- Accounting for leakage:
  - Data to inform the setting of an appropriate discount factor for increasing coal production

Technical Working Group

- ARB is convening a technical working group to provide:
  - Technical expertise
  - Forum for issue discussion
  - Problem resolving
- Kick-off call: April 2013
  - Monthly meetings
  - Identify technical experts
    - Contact program staff if interested
  - Summary of meetings
  - Available to the public

Program Contacts

- Steve Cliff, Chief, Program Evaluation Branch, scliff@arb.ca.gov
- Greg Mayeur, Manager, Program Operations Section, gmayeur@arb.ca.gov
- Jessica Bede, Coal mine methane protocol contact, jbede@arb.ca.gov
- Yachun Chow, Rice cultivation protocol contact, ychow@arb.ca.gov

Please submit your comments to:

http://www.arb.ca.gov/cc/capandtrade/comments.htm

by 5:00 pm April 22, 2013

Questions?