Quantifying Greenhouse Gas Fluxes In Agriculture and Forestry: Methods for Entity-Scale Inventory (Second Edition)

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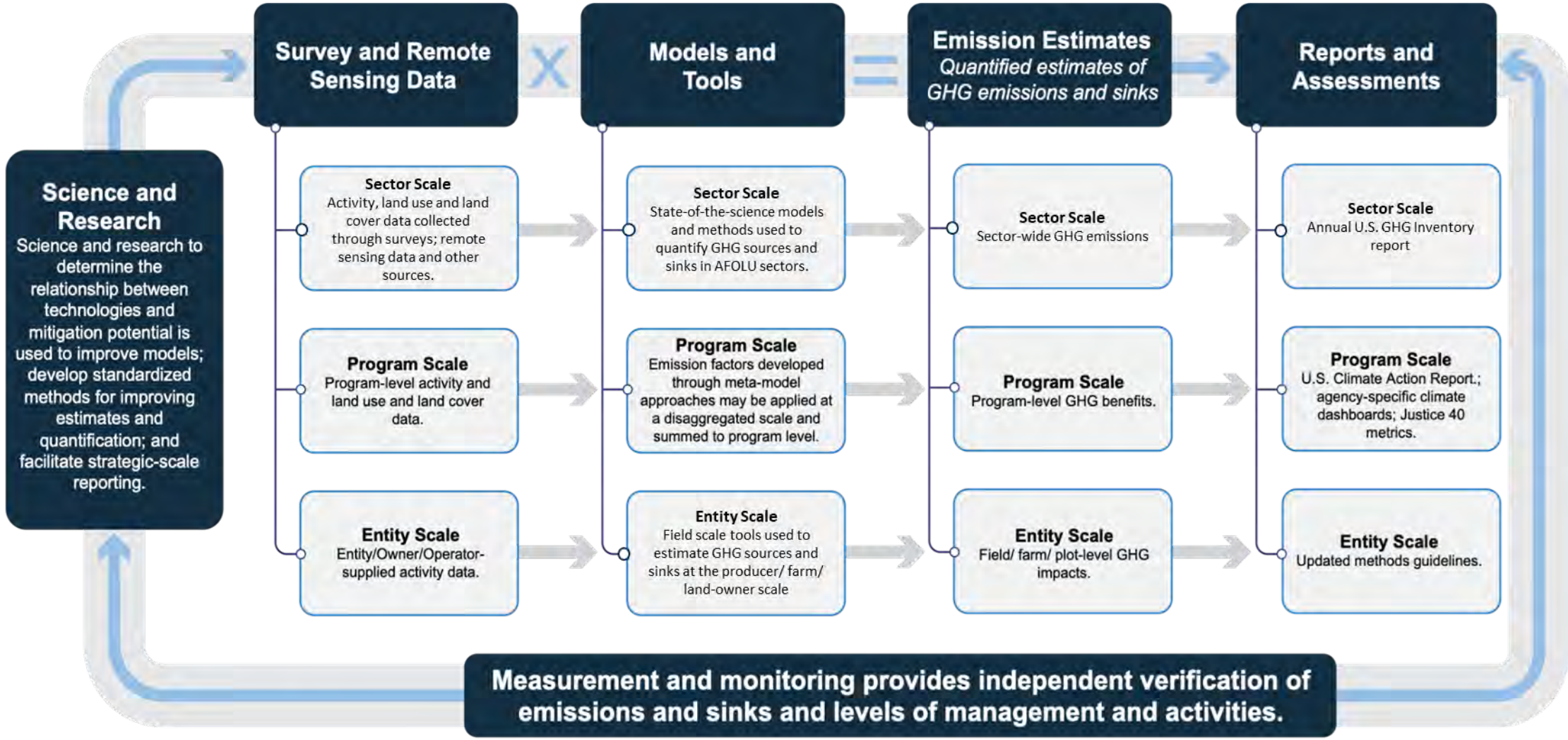
Aug 17, 2024

Economic Sector, Program, and Entity-Scale Framework for Greenhouse Gas MMRV within the Agriculture Sector



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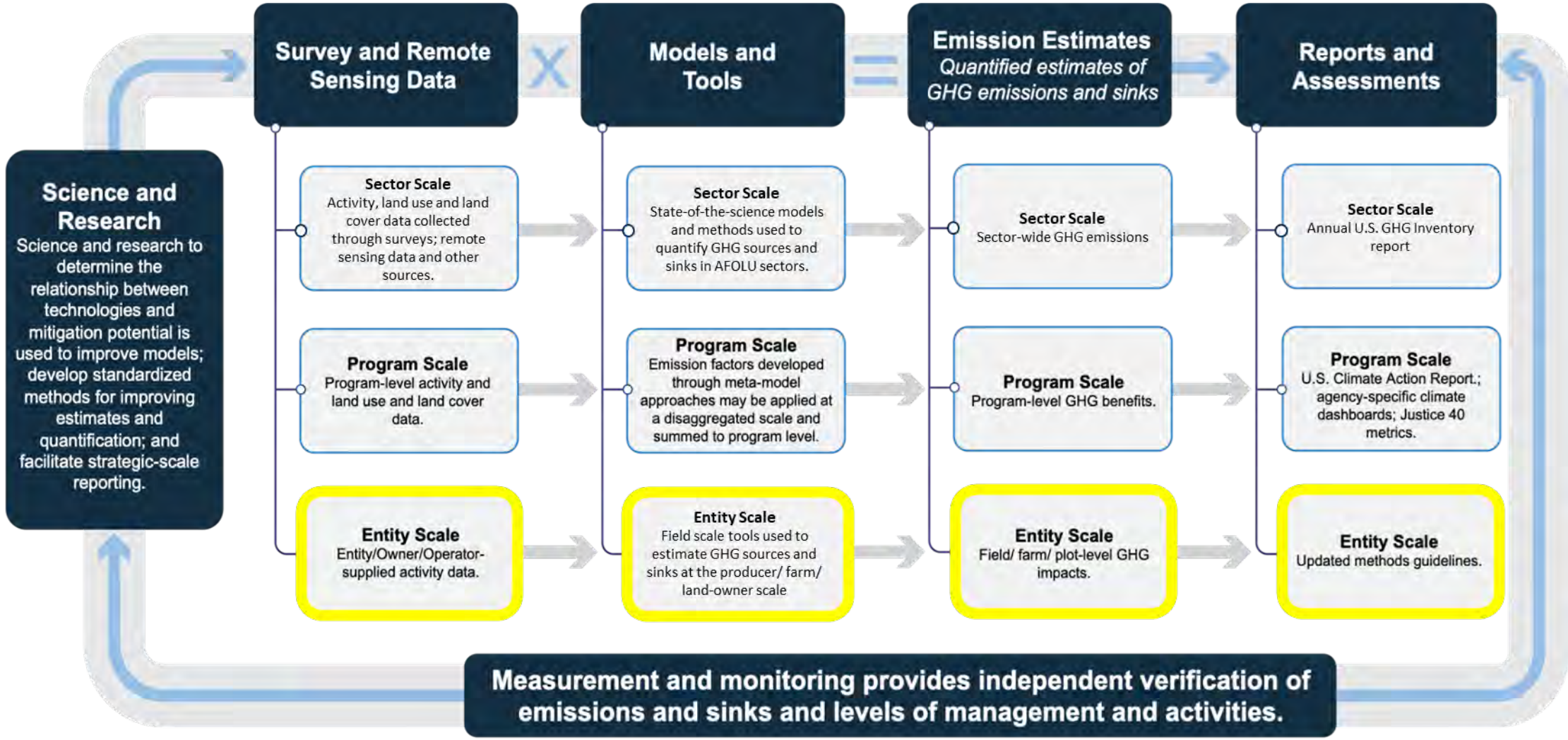
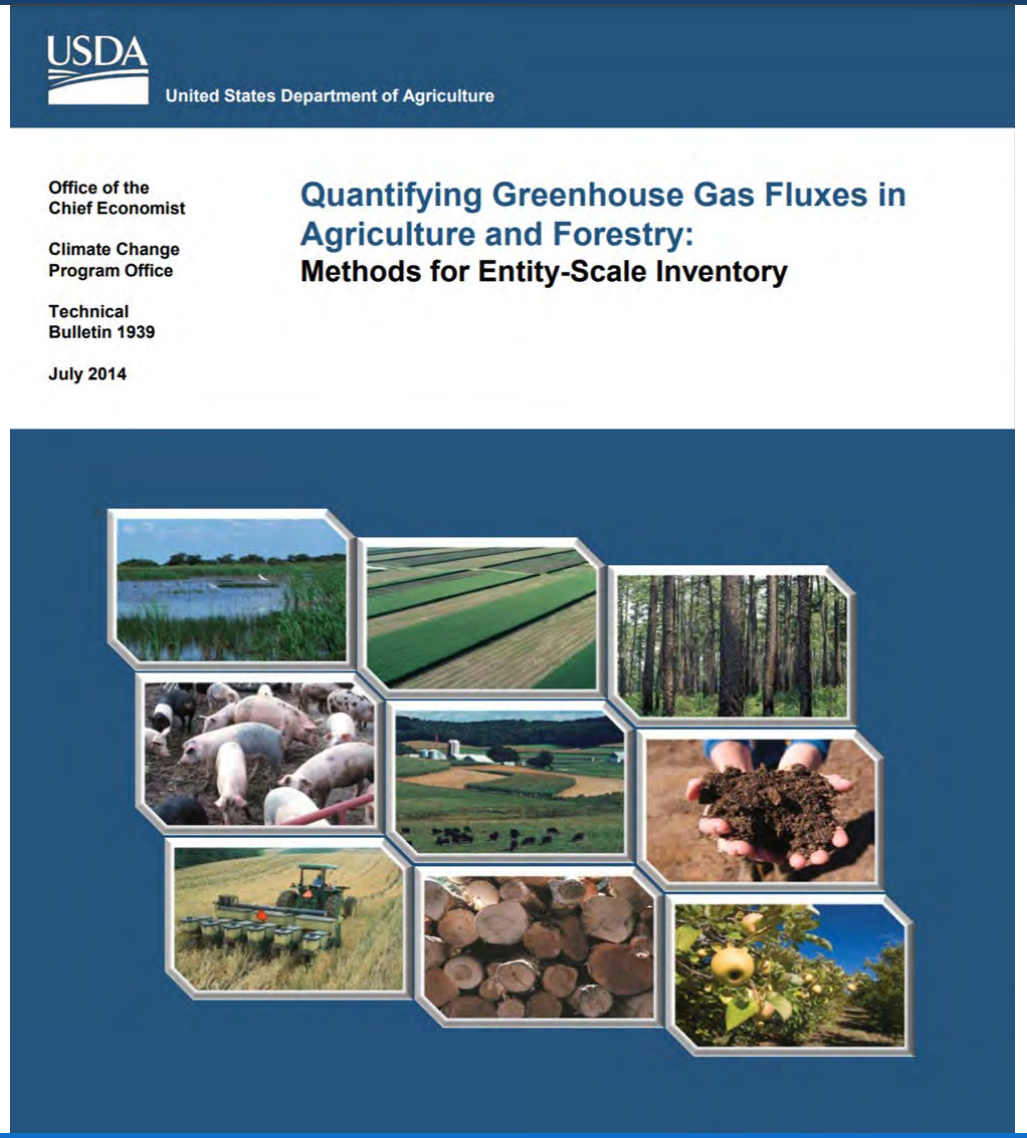


Background

Provisions of Section 2709 of the Food, Conservation, and Energy Act of 2008 directed The U.S. Department of Agriculture (USDA) to prepare technical guidelines and science-based methods to measure environmental service benefits from conservation and land management activities, initially focused on carbon.

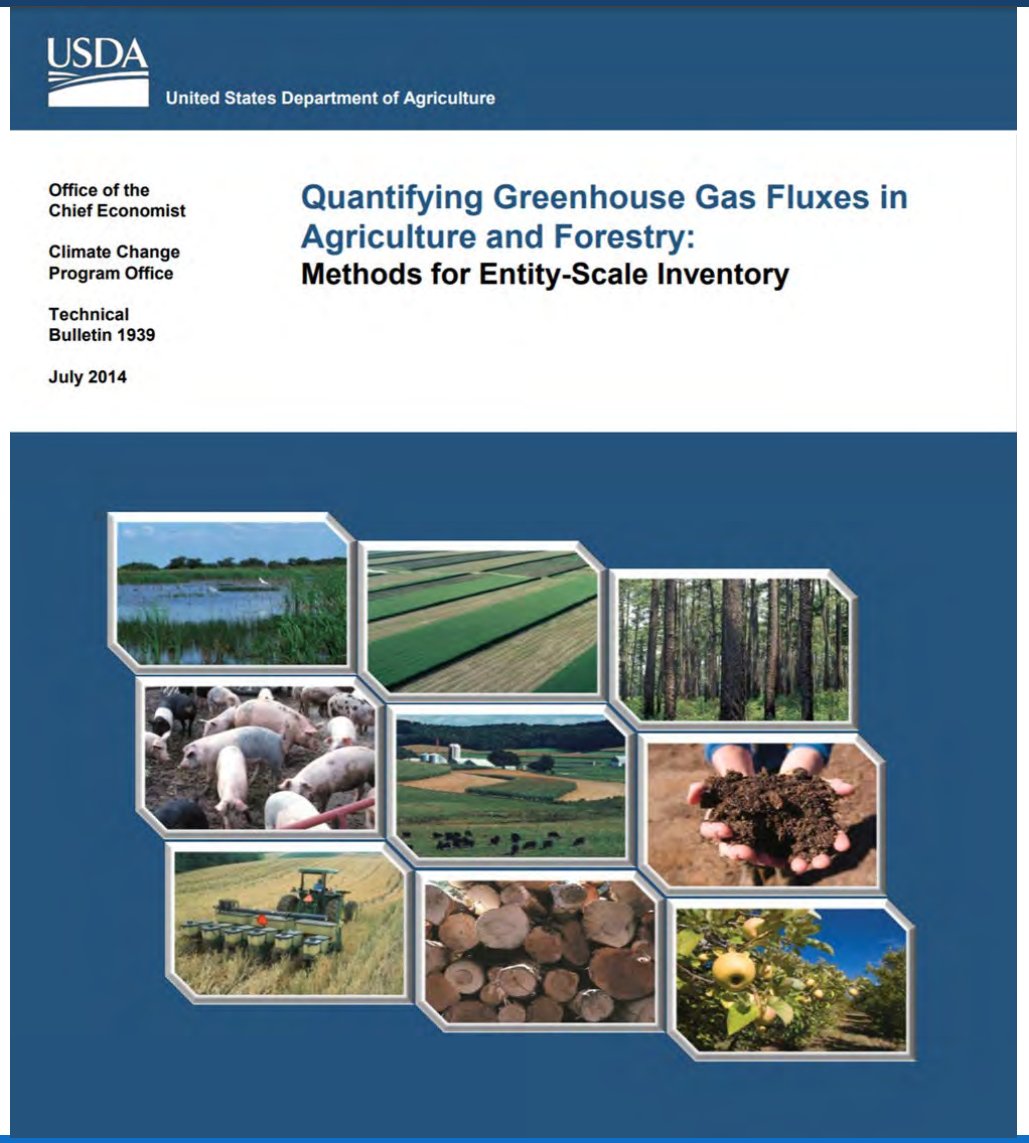
In 2014, USDA published *Quantifying Greenhouse Gas Fluxes in Agriculture and Forestry: Methods for Entity-Scale Inventory*.



Background

This report, referred to within USDA as the Methods Report or the Blue Book, has several important purposes:

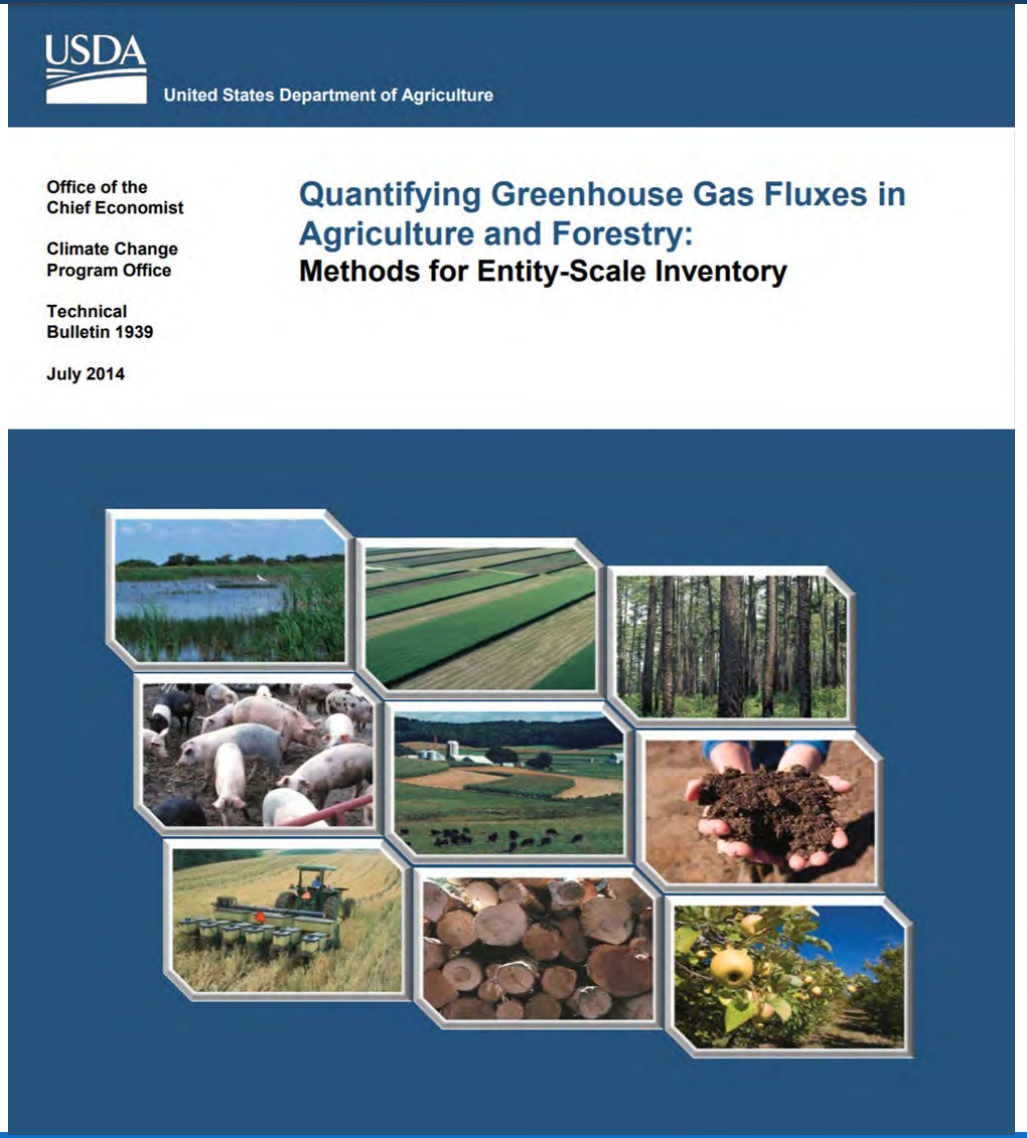
1) It enables landowners and others to estimate entity-scale greenhouse gas (GHG) fluxes and impacts using the most accurate science-based methods currently available.
2) It allows USDA to estimate GHG fluxes from current and future conservation programs and practices
3) The report serves as the foundation for many of USDA's GHG estimation tools, including COMET (Farm and Planner), and the forthcoming GLEE tool.
4) The methods in the report also inform the GHG estimates of other programs, including voluntary GHG registries, and support the development of protocols for climate smart commodities.



Background

The quantification methods in this report are designed to:

- Stand on their own, independent of any other accounting system, yet stay as consistent as possible with other accounting systems.
- Evaluate fluxes for the entirety of a farm, ranch, or forest, but also appropriate for evaluating individual management practices, and adaptable for use at multiple scales, and in environmental markets.
- Address practical concerns around GHG estimation, including the risk of reversal.
- Display consistency and transparency in reporting.
- Calculate GHG fluxes across multiple years, showing changes over time.
- Allow for integrated estimates by bringing approaches from across the agriculture and forestry sectors into a single report.

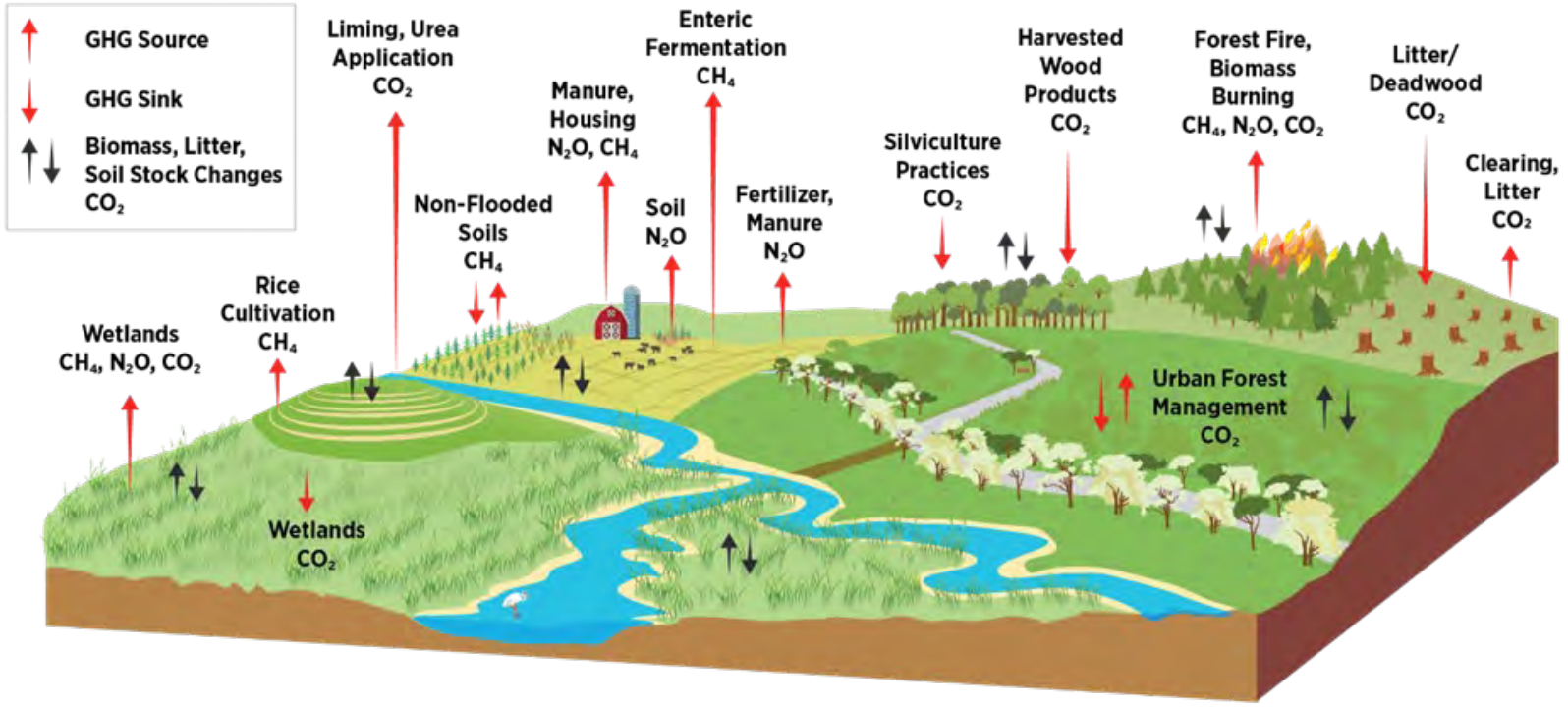


Ag and Forestry Fluxes

This report provides users with the methods needed to quantify GHG fluxes from agriculture and forestry systems.

This includes:

- Fluxes from croplands and grazing lands (biomass, litter and soil stock changes, rice cultivation, non-flooded soils, urea and liming, biomass burning)
- Animal production (enteric fermentation, manure management, and housing)
- Forestry (silviculture, harvested wood products, forest fires, biomass burning, litter/deadwood, litter clearing, urban forest management)
- Wetlands (biomass, litter/deadwood, flooded soils)
- Land-use Change (biomass, soil stock changes, litter/deadwood)

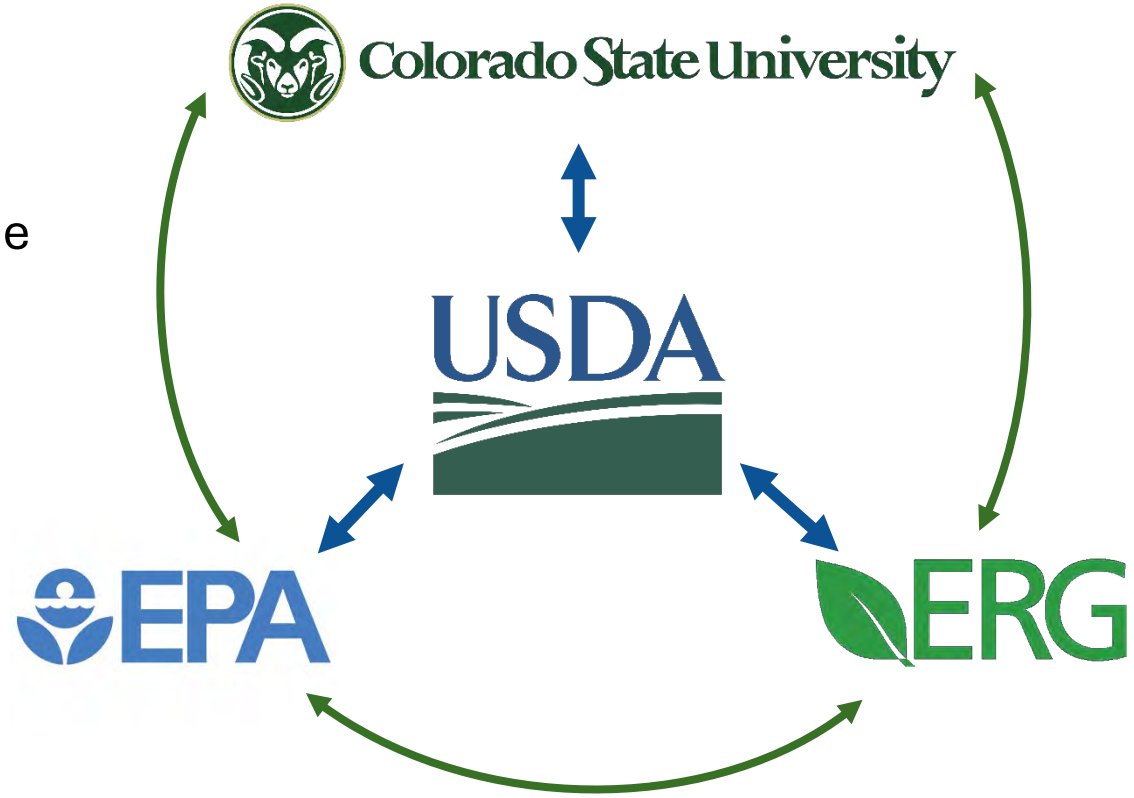


Methods Report Update

The Methods Report is designed to be iterative, with periodic updates to ensure the methods reflect the best available science

- USDA's Office of the Chief Economist (OCE) has spent the last decade collaborating closely with government, university, and private sector partners to make substantial improvements to the models and methodology used to derive agricultural GHG estimates

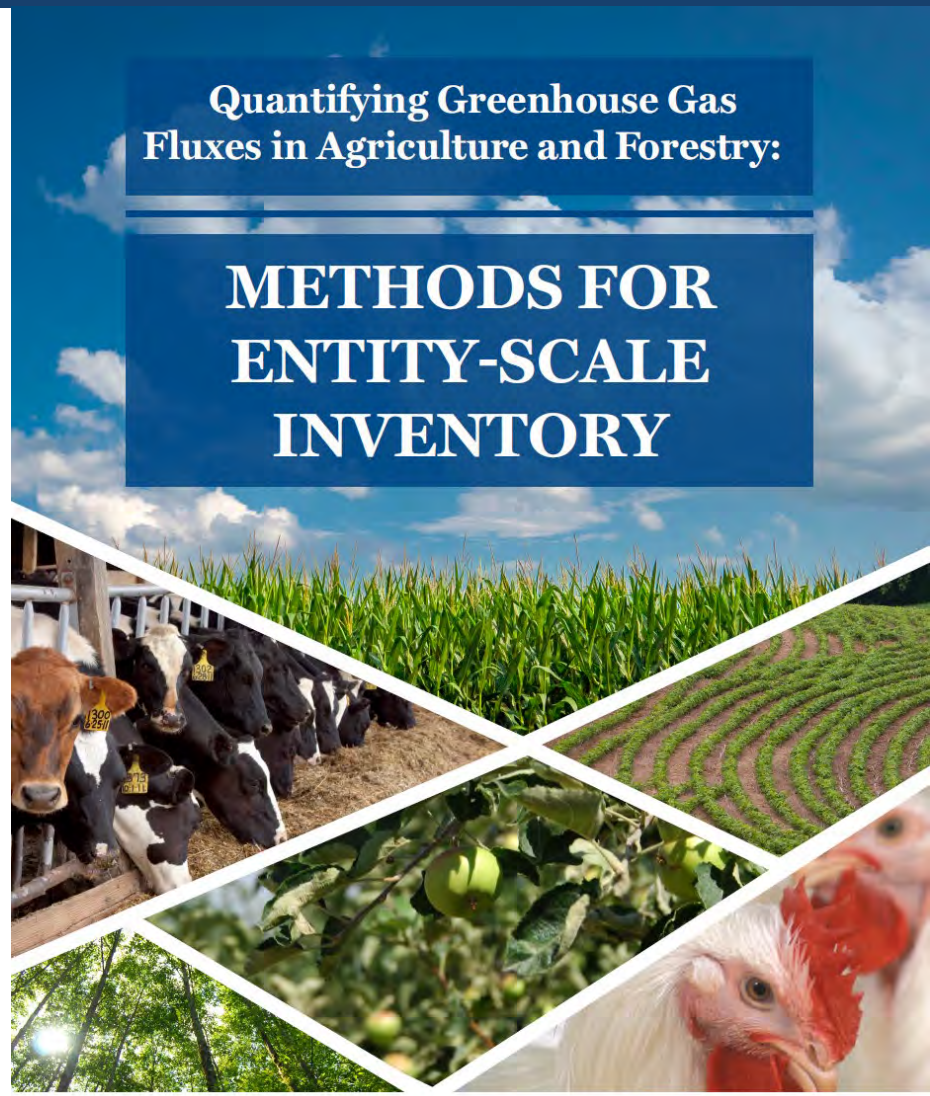
- The result of this collaboration has been the development of models and GHG quantification methods that provide consistency in GHG emissions estimates at both the agricultural sector-scale and entity-scale



Methods Report Update

The 2nd edition of this report was published in April 2024

- USDA-OCE spent the past four years developing the second edition of the entity-scale methods report.
- This update represents the work of a team of more than 60 authors, including USDA scientists, university researchers, and experts from non-government environmental organizations and research institutions.
- Lead authors for the report include:
  - Wes Hanson, USDA-OCE (Chapters 0-2)
  - Stephen Ogle, Colorado State University (Chapters 3, 6, 7)
  - April Leytem, USDA-ARS (Chapter 4)
  - Lara Murray and Chris Woodall USDA-FS (Chapter 5)
  - Jay Breidt, Colorado State University and University of Chicago (Chapter 8).



Methods Report Peer-Review

The 2024 Methods Report was published as a Highly Influential Scientific Assessment, a designation reserved for the most influential science published by the U.S. Government

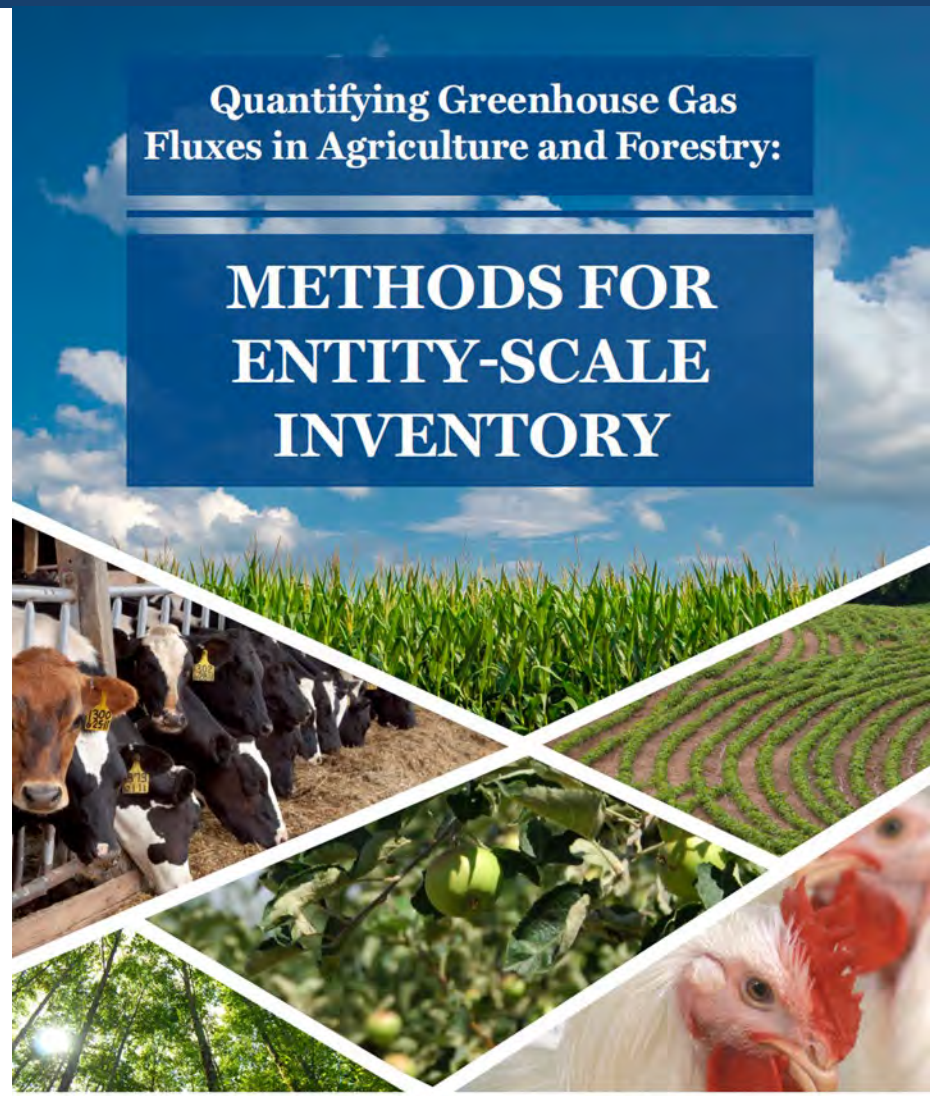
To qualify for this designation the report has undergone rigorous internal and external review, including the following:

- USDA-OCE policy review of updated chapters
- Expert review of cropland and grazing land systems, animal production systems, and managed forest systems chapters.
- All chapters reviewed internally by USDA agencies.
- All chapters reviewed by the COMET team at Colorado State University.
- All chapters were sent to reviewers at agencies across the U.S. Government.
- Draft version of the report published in the Federal Register for public comment.
- Report reviewed by HISA review panel

Methods Report Update

Major changes have been made throughout the report:

- Existing methods have been updated throughout and now align with the 2019 Refinement to the 2006 IPCC Guidelines
- New methods have been added for several practices not included in the 2014 report
  - Cattle feed additives including 3-NOP, nitrates, and lipids
  - Cattle diet manipulations including supplemental fat and grain types that can reduce enteric methane production
  - The use of biochar as an amendment to increase soil carbon
- The rice cultivation method now accounts for difference in the two primary rice growing regions in the U.S.
- The managed forest systems chapter now includes an excel workbook tool
  - Allows users to create basic projections of forest carbon, determine the carbon benefits of extended rotations, reforestations, and avoided deforestation, and quantify the GHG flux from harvest and both natural and prescribed fire in a forest stand
- The user experience has been substantially improved



Looking Ahead

The Inflation Reduction Act included $300 million to fund the improvement of MMRV in the agricultural sector

- The workstreams that are establishing a soil carbon monitoring system and establishing a GHG research network for trace gases will directly inform future iterations of this report

International partners have shown a great deal of interest in the work we're doing to quantify entity-scale emissions

Being designated as a HISA will require a faster cadence to future updates to the Methods Report

- Updates to the wetlands and land-use change chapters will begin in 2025

Thank you!