

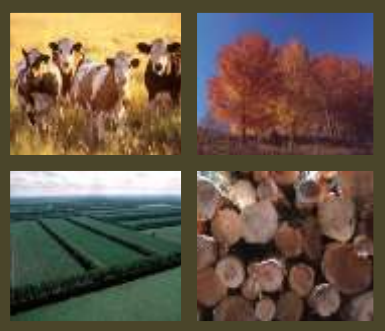


***Quantifying Farm-Scale Greenhouse Gas Fluxes in the
U.S.: Methods, Challenges and Data Gaps***

World Congress on Conservation Agriculture

Winnipeg, Manitoba

June 24, 2014



Developing Science-Based Methods and Technical Guidelines for Quantifying Greenhouse Gas Sources and Sinks in the Forest and Agriculture Sectors

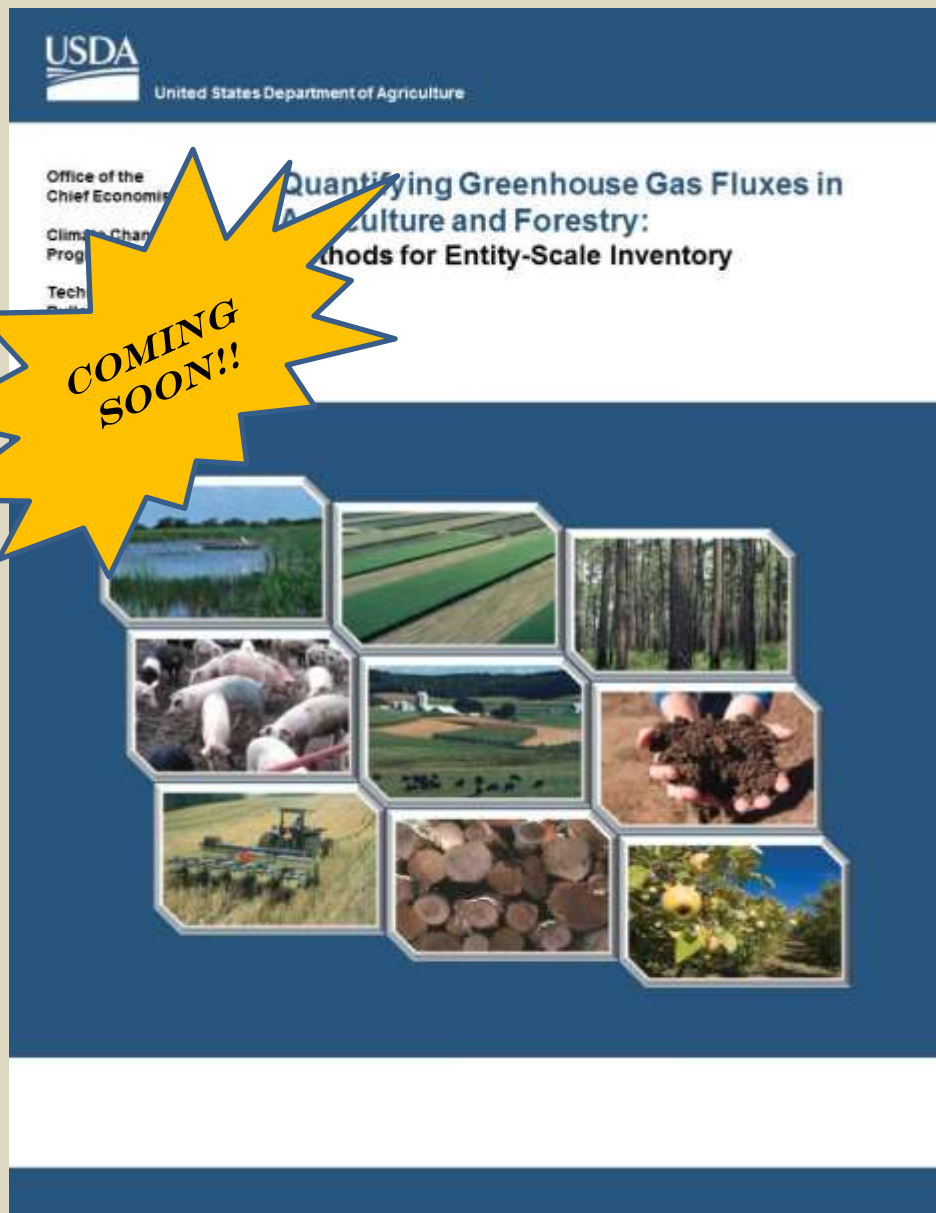
Goal: To create a standard set of GHG quantification methods and tools for landowners, USDA, and other stakeholders.

- Phase 1: Report outlining comprehensive science-based methods for entity-scale GHG estimation.
- Phase 2: Develop a user-friendly tool that follows the methods report to provide land owners and managers with reliable and understandable estimates of GHG emissions and C sequestration.



REPORT LAYOUT AND CONTENT

- Executive Summary
- Introduction
- Considerations
- Crop and Grazing Lands
- Wetlands
- Animal Systems
- Forest lands
- Land Use Change
- Uncertainty Assessment



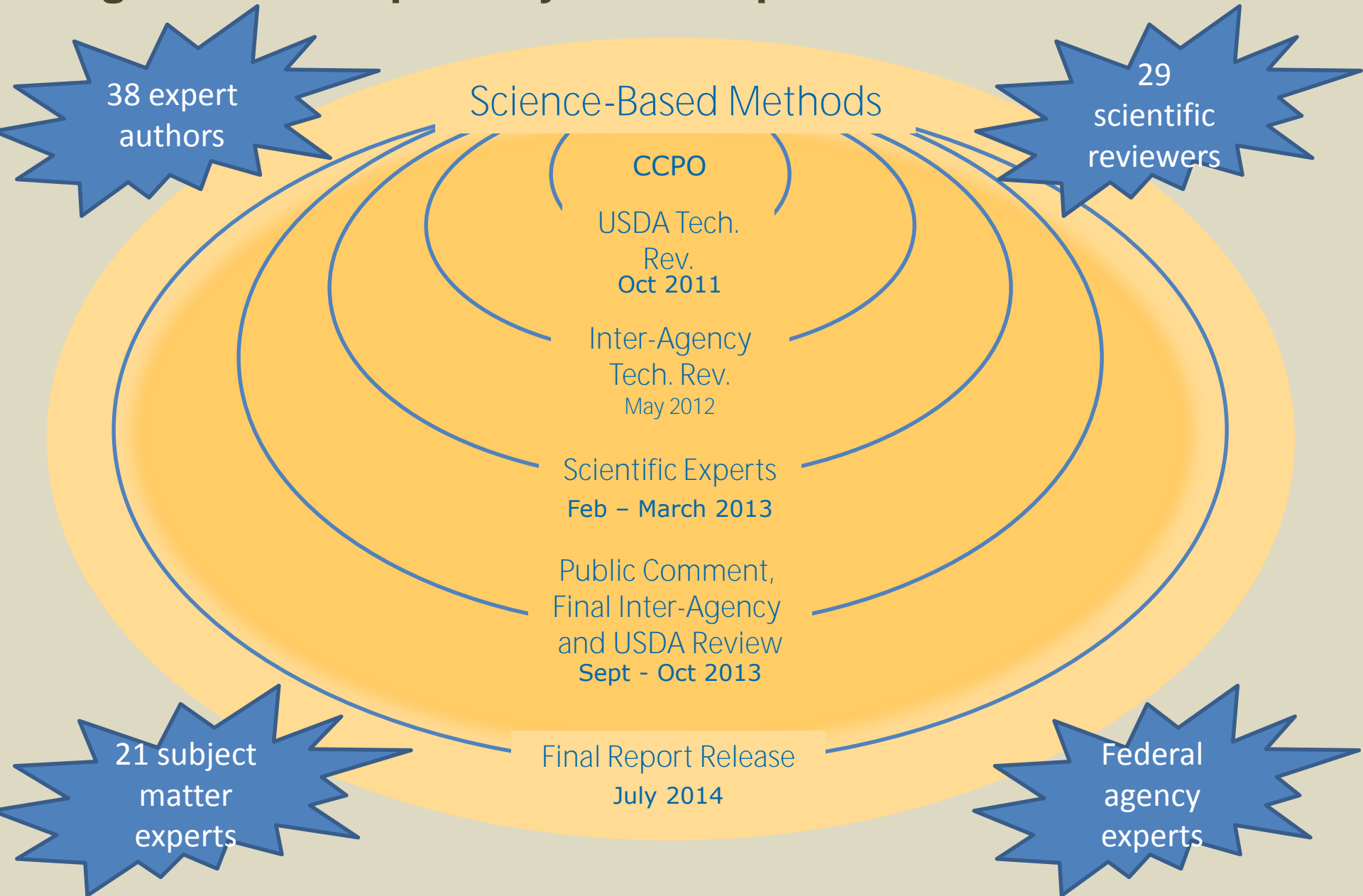


THE USDA GHG METHODS

The Methods Report is designed to be:

- A scientifically vetted means for USDA to provide local-scale, standardized and transparent estimation of GHG fluxes
- Consistent with the USDA and EPA national GHG inventories
- Aligned with NRCS's COMET Farm and other USDA GHG tools.
- Coordinated with water quality or other tools to assess environmental services benefits

CHALLENGE: Vetting the methods. Establishing the rigor and transparency of the report.





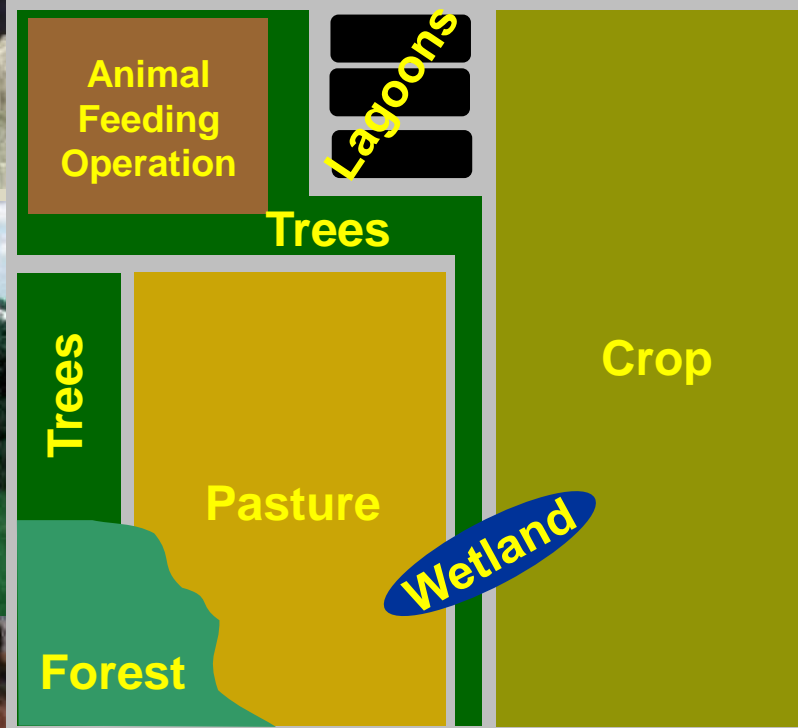
KEY CONSIDERATIONS

- 1. Transparency***
- 2. Consistency***
- 3. Comparability***
- 4. Completeness***
- 5. Accuracy***
- 6. Cost effectiveness***
- 7. Ease of use***

BALANCING ACT

- ✓ Maximize accuracy ... but maintain ease of use
- ✓ Complete ... but cost effective
- ✓ Stand alone ... but consistent and comparable
- ✓ Transparent ... but with scientific rigor ... and user-friendly

CHALLENGE: Capturing management of the whole operation



Cropland



- Fertilizer management
- Tillage management
- Crop rotations
- Cover cropping
- Water or residue mgmt in cultivated rice
- Drainage
- Irrigation
- Biomass burning

Forestry



- Thinning and harvest
- Fertilizer management
- Species management
- Irrigation
- Biomass burning
- Planting/re-establishing
- Clearing and/or land conversion

Grazing Land



- Fertilizer management
- Grazing management
- Species enhancement
- Drainage
- Irrigation
- Prescribed burning

Agroforestry



- Windbreaks
- Alley cropping
- Silvopasture
- Riparian forest buffers
- Forest farming
- Species selection/mgmt
- Cropping system/mgmt

Livestock



- Animal housing
- Feeds and additives
- Feeding management
- Manure collection and storage
- Composting
- Land application of manure

Managed Wetlands



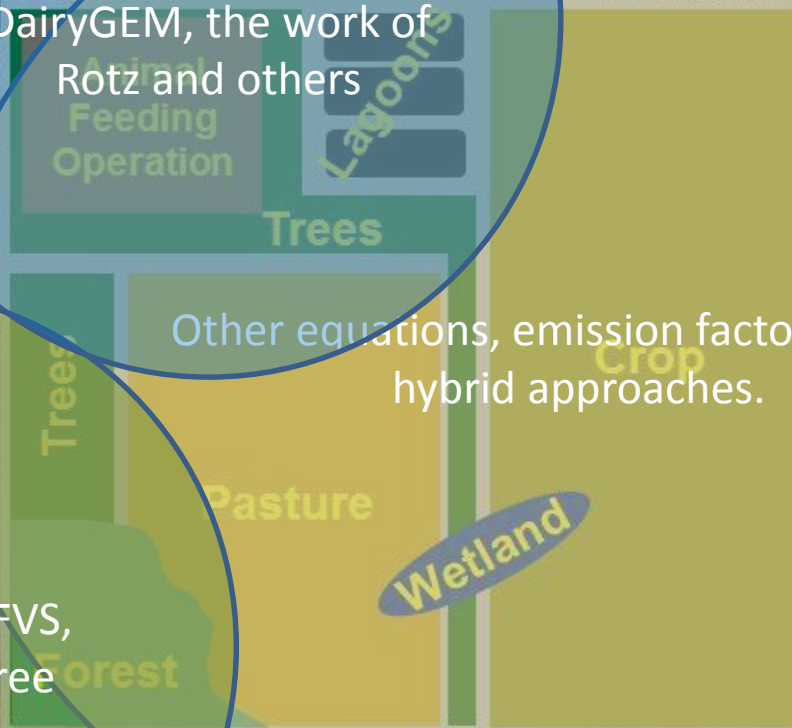
- Species mix
- Biomass management
- Water management

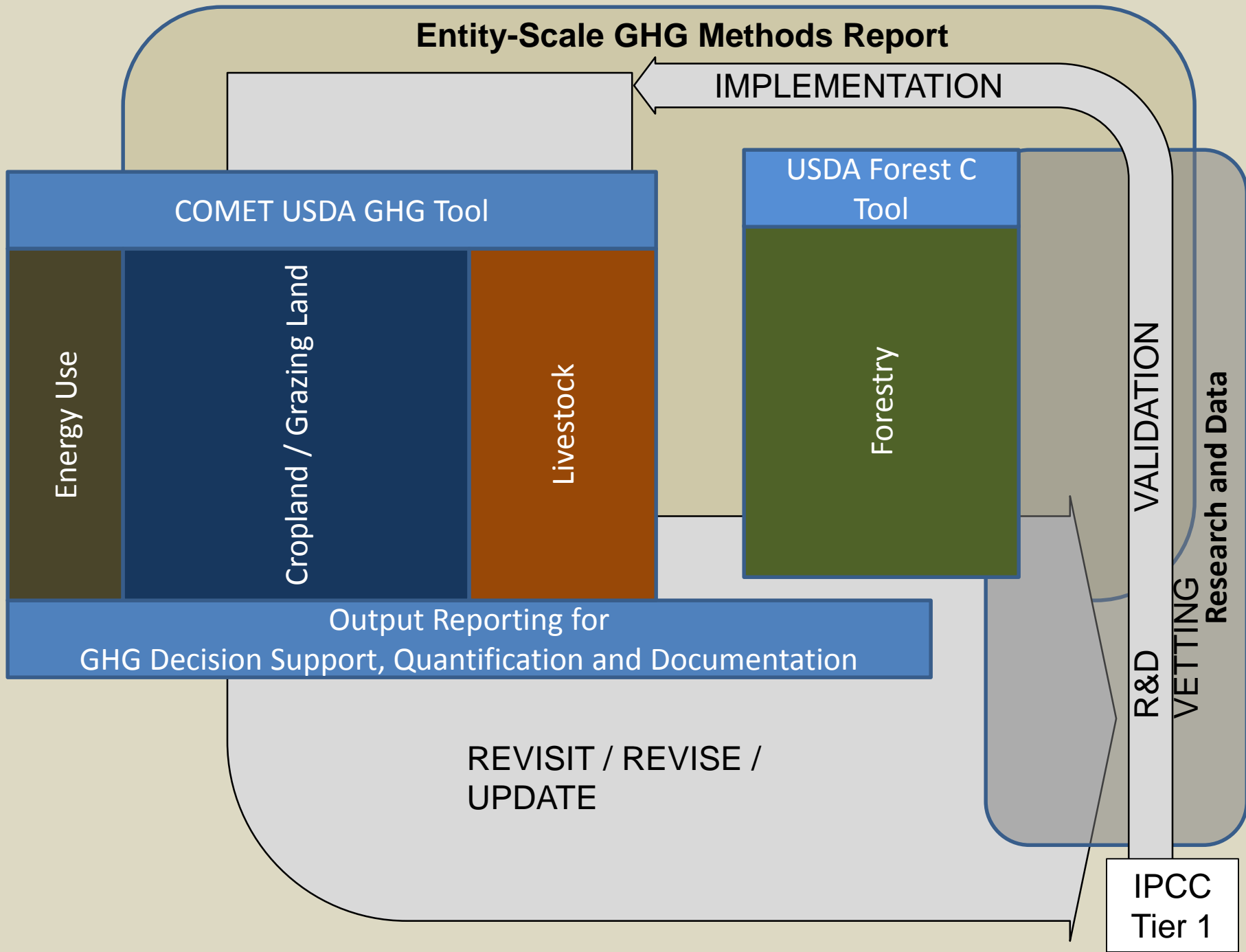
CHALLENGE: Bringing all the methods together into a seamless estimation tool.

ARS Tools like DairyGEM, the work of Rotz and others

Other equations, emission factors, or new hybrid approaches.

USFS Tools like FVS, FOFEM, and iTree





CHALLENGE: Assessing uncertainty.

- Merging models and input data sources
- Including expert judgment for variables and error
- Issues of scale

Monte Carlo Simulation

- How to establish PDFs for variables that don't have data?



NOTABLE RESEARCH GAPS AND DATA NEEDS

- Extrapolating to all areas of the U.S.
- Climate / soils / management interactions
- Additional data on cropping practices
 - Agroforestry
 - Specialty crops
 - Cover cropping
 - Fertilizer application
 - Biochar application
- Uncertainty Assessment
 - Data to support probability density functions
 - Data across the full set of management practices



CONTACT INFORMATION

Thank you!

Marlen Eve
U.S. Department of Agriculture
Climate Change Program Office
meve@oce.usda.gov
(202) 401-0979

www.usda.gov/oce/climate_change