

## **Recommendations for Policy Makers on Managing Uncertainty in Models and Agricultural Offset Protocols**

These recommendations, based on the C-AGG White Paper and Executive Summary on the same topic<sup>i,ii</sup>, reflect agreement from the C-AGG multi-stakeholder coalition regarding the use of models to estimate changes in GHG emissions from agriculture. Models are a science-based and cost-effective method to calculate GHG emission reductions at the farm scale. As with any measurement tool, it is necessary to ensure the proper use of models and to reliably estimate and manage uncertainty. Models include empirical models (based on historical measurements); and mechanistic or process models (which model the underlying biogeochemical processes).

### **Key C-AGG Statements Related to Managing Uncertainty and the Use of Models in Agricultural Offset Programs, Protocols, and Policies**

- Direct GHG measurements in agriculture are generally cost-prohibitive for GHG inventories and carbon offset projects. Used properly, models can confidently and conservatively quantify GHG emissions reductions for these purposes.
- Model accuracy and suitability can and should be tested and confirmed before use.
- Uncertainty introduced by the model itself (structural uncertainty) or by the input data (input uncertainty) can be estimated and managed.
  - One way to manage uncertainty in offset programs is through discounts or deductions to the awarded offset credits.
  - Structural uncertainty is most appropriately addressed through policy choices at the program level rather than the project level.
  - Input uncertainty may be most appropriately accounted for at the site, project, or program level depending on a variety of factors.
- The certainty of modeled estimates increases as the total number and diversity of project sites increase.
  - When emissions reductions from multiple sites are considered together, the certainty of estimates is greater than when any individual site is considered alone.
- Offset programs should pursue policies such as aggregation that increase certainty and encourage greater participation from the agricultural sector.
- Mechanistic models can estimate GHG emissions reductions from innovative agricultural practices, but can require more data than empirical models. Empirical models, while less complex, may be less flexible in this regard.

Agricultural systems are complex biological systems characterized by variability among producers, localities, and time. Quantifying GHG emissions from agricultural systems is challenging compared to stationary industrial sources, but can be achieved with rigor and conservativeness with the right tools.

***C-AGG supports:***

- GHG offset markets as a policy tool to incentivize and achieve GHG emissions reductions within the agricultural sector at a scale that is meaningful for the sector, for compliance and voluntary offset markets, and for GHG mitigation;
- the use of models within agricultural offset protocols as an appropriate and cost-effective way to quantify net GHG impacts when assessing multiple management practices and other important variables that can affect GHG emissions;
- the development of offset programs and policies that properly account for and manage uncertainty when models are used to estimate GHG emissions or emissions reductions;
- the use of models in offset programs to enhance agricultural sector participation by lowering costs and allowing for approaches that promote aggregation, which in turn increases certainty of GHG reduction estimates; and
- the use of mechanistic models when assessing innovative practice changes and approaches to reduce GHG that less complex and less flexible measurement tools and empirical models often cannot accommodate.

*These recommendations are based on the related C-AGG documents cited below.*

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<sup>i</sup> Coalition on Agricultural Greenhouse Gases, ***C-AGG White Paper: Uncertainty in Models and Agricultural Offset Protocols***, 16 pp, Version 1, August 2012.

<sup>ii</sup> Coalition on Agricultural Greenhouse Gases, ***C-AGG Executive Summary: Uncertainty in Models and Agricultural Offset Protocols***, 3 pp, Version 1, May 2012.