United States Department of Agriculture

Office of the Chief Economist
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INFORMATIONAL MEMORANDUM FOR SECRETARY VILSACK

From: Joseph W. Glauber
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Subject: Status of Analysis of Offset Provisions of Climate Change Legislation

ISSUE:

Last December, you asked me to work with the Environmental Protection Agency to review the assumptions and update the economic model used to analyze greenhouse gas offsets and develop options on how best to avoid unintended consequences for agriculture that might result from climate change legislation. This memorandum provides a status report on this effort.

DISCUSSION:

On December 18th, the Office of the Chief Economist (OCE) released a study on the economic impacts associated with a national greenhouse gas (GHG) cap-and-trade system based on results provided by the Environmental Protection Agency (EPA). Consistent with other studies, the OCE study showed GHG offsets could provide aggregate economic benefits for the agriculture sector. However, much of the economic benefit was caused by large shifts in land use as landowners planted trees to sequester carbon. These land use shifts result in higher commodity prices and reductions in livestock production.

Work is proceeding to respond to your request for refined analysis of climate change legislative proposals. USDA and EPA have worked together over the past two months to better understand and improve our analysis. We are focusing efforts in three areas: external peer review; review and refinement of baseline assumptions; and assessment of alternatives for policy implementation.

External Peer Review

EPA is conducting an external peer review of the Forest and Agriculture Sector Optimization Model (FASOM) used to assess the economic impacts of a national GHG cap-and-trade system.

EPA has requested our assistance in identifying technical experts who could serve on a review panel and welcome the participation of USDA experts. We have offered to provide guidance on procedures used by USDA-Economic Research Service in peer review of economic models.

Review and Refinement of Baseline Assumptions

We are also conducting an internal review of the FASOM baseline assumptions. In our meetings with EPA and the FASOM team, we have learned that a number of major revisions and updates to the model are underway but not completed. We have approached the three groups that are primarily responsible for FASOM (Texas A&M, Forest Service PNW Station-Oregon State University, and Duke University) and offered to cooperate with them and support model refinements with a goal of developing a version of the model that can be used as the basis of further offsets policy analysis. We are pursuing cooperative agreements with Texas A&M and Duke University and have secured a commitment for support from the Forest Service and Oregon State University.

As part of this internal process we are focusing on a limited number a sensitive baseline assumptions including: future crop and afforestation yields, uncertainty in yields and carbon prices, biomass energy demand, and future conservation policy.

We will refine future crop yield assumptions in FASOM to reflect growth rates that are consistent with the recently released USDA Agricultural Long-Term Projections. In addition to crop yields, we will refine the afforestation yield assumptions in FASOM. FASOM currently uses a set of afforestation yields derived from field trials. These yields represent the optimal yields that could be expected for a forest type in a region. We've compared these yields against those derived from official Forest Service forest inventory data. The forest inventory yields represent an average of current forests in a region. The two sets of yields are similar in the South and Pacific Northwest. However, in the Northeast and Corn Belt the yields currently in FASOM are 2-3 times higher than those derived from forest inventory data. Using lower forest carbon yield assumptions for the Corn Belt and Northeast would limit the amount of afforestation in these regions.

We will also change the rate at which land can move between forest and crops to reflect future economic uncertainty. FASOM assumes perfect foresight, that is, future commodity prices and carbon prices are known to landowners. In reality, it is costly to convert cropland to forest and costly to convert back to cropland. These conversion costs coupled with uncertainty in commodity and carbon prices means that landowners will only convert land when the expected returns are significantly higher compared to a perfect foresight assumption.

With respect to biofuels, the 10 percent limit on ethanol blends and limited growth in flexible-fueled vehicles restricts the growth of corn starch based ethanol in the current FASOM baseline. We are exploring a number of alternatives regarding future demand for biofuels including an ethanol growth rate based on profitability.

The future of the Conservation Reserve Program will also influence land availability for carbon sequestration under a cap-and-trade system. We plan to explore two alternative scenarios which

will reduce land pressure and help reduce impacts on commodity production: reducing the number of acres enrolled in the program or allowing farmers that are enrolled to also participate in carbon sequestration crediting under a GHG offsets program.

Policy Scenarios

It is critical that the assumptions used to simulate policy actually reflect how the policy is likely to be implemented. The March 2009 FASOM runs used by EPA and USDA last year simulated a generic climate change policy rather than the specific offsets program under HR 2454. We have identified a number of assumptions contained within the FASOM policy runs that diverge from the components of legislation passed by the House of Representatives.

For example, FASOM does not simply provide payments for GHG offsets, but rewards emissions reductions and penalizes emissions. This modeling construct allows the model to assess a hypothetical policy that would allocate credits and debits for carbon in a highly efficient manner. However, it would be difficult (perhaps impossible) to establish an offset program that functioned like this. The implication of this assumption is the model likely discourages activities in the farm sector that generate GHG emissions (especially livestock production).

In addition, FASOM only provides GHG credits for actions that do not occur in the baseline projection. This assumption is important in evaluating technologies and practices are already being adopted by some farmers. Examples of these types of technologies include conservation tillage and the use of anaerobic digesters. In the case of conservation tillage/no-till, FASOM assumes baseline adoption rates of 45% in 2015 and rise to over 60% by 2050. FASOM provides offset credits for tillage changes only above this adoption rate. Putting the question of whether this trajectory is correct, the reality is that we do not have the ability to identify which farmers would have adopted tillage changes on their own and which ones are changing practices to receive GHG offset credits.

Some actions to mitigate GHG emissions can reduce commodity output. Afforestation is a good example of this type of practice. A concern with these types of practices is the emissions associated with the initial activity can be simply displaced rather than reduced. An action to plant cropland to trees may result in land elsewhere being converted from forest to cropland. Because FASOM inherently rewards emission reductions and penalizes emissions – it includes disincentives to convert forests to crops. However, since HR 2454 excludes agriculture and forests from the cap, the actual policy would not penalize land conversions from forests to crops. Other approaches to deal with leakage such as discounts or limits on incentives will need to be developed and analyzed.

We expect these policy scenarios to be incorporated into FASOM once a version of the baseline model is locked in. We anticipate using the model to simulate a variety of policy options and alternatives through the latter half of this year with informal and formal products being produced at various points during that timeframe.

NEXT STEPS:

Improving FASOM is part of a broader effort to better understand the economics of GHG offsets. We are conducting an analysis of the technical potential of individual technologies and practices. Three technical teams within the Department are identifying GHG offset technologies and practices on croplands, livestock operations, and forests. We are evaluating various mitigation strategies for crop and livestock producers and are evaluating other mechanisms that could be employed to avoid or mitigate unintended consequences.