Economic Potential for Agricultural Non-CO2 Greenhouse Gas Mitigation: An Investigation in the United States

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This paper addresses the economic potential of U.S. agriculture and forestry to mitigate emissions considering carbon, nitrous oxide and methane focusing to a large extent on the possibilities for Non CO2 strategies both independently and in an overall approach. It also reports on an examination of the dynamics of non-CO2 mitigation strategies. The paper reports results from a multi-period analysis of agricultural and forestry response to prices for GHG offset production. The model used is called FASOMGHG and is a 100 year forest and agriculture model .It covers GHG mitigation activities in 11 U.S. regions and 63 U.S. Sub-State regions), 28 foreign regions for 8 commodities, plus world market for 50+ other commodities. The 100 year period is simulated in decadal time steps. The forestry and agricultural sectors are linked through land and some commodity transfers. The model has rather detailed coverage of agricultural carbon and non-CO2 plus forest carbon management alternatives. Using FASOMGHG marginal abatement curves are generated under alternative policy scenarios. The model results give overall and component response at varying carbon equivalent prices revealing an “optimal” portfolio of agricultural greenhouse gas emission related management alternatives. We also observe model results on commodity and factor prices, levels of production, exports and imports, management choices, resource usage, and environmental impacts. Empirically carbon equivalent prices were varied from $0 per metric ton to $100 as constant real price for 100 years. The possible contributions of the gasses were treated both collectively and independently. In particular scenarios where run where only one of CO2, CH4 and N2O were eligible for payments followed by scenarios when non CO2 gasses were all that were eligible and then where all gasses were eligible.

A number of potential insights arise from the model analysis
•Non CO2 gasses can be a significant player although they are somewhat less than one half as important as sequestration
•NonCO2 gasses actions are persistent growing over time while sequestration saturates and diminishes
•Competition exists between strategies and independent assessments can be misleading
•Independent nonCO2 strategies cause significant leakage in the CO2 category

•Enteric fermentation and fertilization based N2O management are highly complementary with CO2 management

More can be found on this type of analysis in the carbon related writings of McCarl and others that can be found on agecon.tamu.edu/faculty/mccarl.