

Catalog of State Actions Agriculture, Forestry, and Waste Management Subcommittee

A catalog of state-level, GHG-reducing actions and policy options based on actions undertaken or considered by state, local, and private actors.

Key to Future Rankings of Options in the Following Tables

Potential GHG Emission Reductions*	Potential Cost or Cost Savings* [†]
High (H): At least 1.0 million metric tons of carbon dioxide equivalents (MMtCO ₂ e) per year by 2020	High (H): \$40 per MtCO ₂ e or above
Medium (M): From 0.1 to 1.0 MMtCO ₂ e per year by 2020	Medium (M): \$15–\$40/tCO ₂ e
Low (L): Less than 0.1 MMtCO ₂ e per year by 2020, or 1 MMtCO ₂ e by 2050	Low (L): Less than \$15/tCO ₂ e
Uncertain (U): Not able to estimate at this time	Negative (Neg): Net cost savings
	Uncertain (U): Not able to estimate at this time

* Several measures may overlap in terms of emissions reductions and/or cost impacts. Estimates assume measures would be implemented independently from other measures.

[†] Costs are denoted by a positive number. Cost savings (i.e., “negative costs”) are denoted by a negative number.

Definition of “Priorities for Analysis”:

- **High:** High priority options will be analyzed first.
- **Medium:** Medium priority options will be analyzed next, time and resources permitting.
- **Low:** Low priority options will be analyzed last, time and resources permitting.

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Jobs, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes/Related Actions in Iowa
AFW-1	AGRICULTURE—PRODUCTION OF FUELS AND ELECTRICITY					
1.1	Expanded use of biomass feedstocks for electricity or steam production	H	L			
1.2	In-state liquid biofuels production	H	L-M	Elevated corn prices;		Lignocellulosic conversion – H; Corn grain remains less optimistic;
1.3	On-farm manure digesters/other waste energy utilization	M	M-H			
1.4	Community manure and organic waste digesters for commercial gas production and electrical generation	M	H			
1.5	Lagoon covers for methane capture and utilization or destruction	M	M-H			
1.6	Biomass energy crop production and utilization	H	L	Improved water quality, wildlife habitat (depending on management), and reduced soil loss		Depend on crop used. If corn stalks, less efficient than if perennial materials
1.7	Renewable liquid fuel tax (based on a combination of energy and carbon balance for the fuel produced)	H	M?	If increased production of perennials resulted, a higher level of soil carbon sequestration would be likely		If designed to encourage high energy return/low carbon footprint, could be H Think this is not a new idea. Could be used to promote lignocellulosic conversion.

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Jobs, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes/Related Actions in Iowa
1.8	Reduction of fossil-derived products and energy in the production of biofuels	M	?			Need more detail; does this refer to use of corn cobs for example to replace natural gas for heating in ethanol production
1.9	Methane management for greenhouse gas (GHG) reduction and for energy production	M	M-H			
AFW-2	AGRICULTURE—LIVESTOCK					
2.1	Manure/methane management capture utilization	M	L			
2.2	Changes in animal feed (including establishing low-methane-producing feed ration demonstration programs or sales tax exemption for low-methane-producing rations)	L-M	?			
2.3	Rotational grazing (improve grazing crops and/or management)	L	?			Impact will depend on what system it is replacing. If replacing row cropping, emission reduction is much greater than if replacing CRP
2.4	Utilize biofilters to control confined animal feeding operation (CAFO) emissions	M	?			Question if there is enough land that would/could be converted to biofilters to make much of an impact
2.5	Increase pasturing and lower densities	M	H			Not likely; land is too expensive; would require LARGE financial support

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Jobs, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes/Related Actions in Iowa
2.6	Manure injection	?	?			
AFW-3	AGRICULTURE—CROP PRODUCTION / WATER, NUTRIENTS, AND SOILS					
3.1	Soil carbon management (including establishing no-till deep-rooting low-N ₂ O carbon sequestering programs and a moldboard plow buy-back and retirement program)	M-H	L-M			Some studies are suggesting no-till's net CO ₂ sequestering ability is lower than previously thought. From McKinsey Report: Conservation Tillage: -\$7/ton Winter Cover Crops: \$27/ton
3.2	Nutrient and water management (including nitrogen conservation practices)	L-M	L			
3.3	Technology improvements to increase efficiency	L-M	M			similar to option 3.7
3.4	Water management	?	?			
3.5	Drainage management	M-H	L			If integrated with wetlands, could be a very good means of sequestering C; Plans are developing on replacing existing drainage infrastructure integrating wetlands; increased crop yields are expected

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Jobs, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes/Related Actions in Iowa
3.6	Biochar production and utilization	H	L-H	Is technically feasible, but yet cost prohibitive.		Cost is dependent on development of the t-chemical conversion technology – there in lies the cost. Could be the largest contributor to C sequestration in the state.
3.7	Precision nutrient application	M	L	Probably reduce net fertilizer application and associated costs		Seems largely dependent on N management
3.8	Establish low N ₂ O emission, high-carbon-retention demonstration fields	L	?			
3.9	Promote periodic carbon mapping of fields	L	?			
3.10	Organic farming	M	L			
3.11	Reduction of fossil-based products and energy in agricultural activities including using wind power to produce anhydrous ammonia	?	?			
AFW-4	AGRICULTURE—LAND USE CHANGE					
4.1	Land use management that promotes grassland cover	H	M			
4.2	Preserve open space/agricultural land	L	H			

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Jobs, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes/Related Actions in Iowa
4.3	Develop land cover maps identifying marginal lands including wetlands (where permanent cover should be targeted)	L	M			Policy must be developed to utilize these lands; the maps are only a tool allowing targeting of permanent cover;
4.4	Reduce incentives for absentee land ownership and develop incentives for farm owner operators	M	L	Assumption: land owner/operators manage differently than short term renters and that these practices favor C sequestration and sustaining the soil resource.		Would improve efficiency of policy in creating behavior change related to C management activities. Short term leases make establishing and managing perennials very difficult. Suggested that this option is difficult to estimate as this is an “indirect” option – GHG reductions from this would be seen in other options.
4.5	Wetlands protection/conservation	M	L-H			If coupled with improved drainage systems, the cost could be L;
AFW-5	AGRICULTURE—FARMING PRACTICES					
5.1	Reductions in on-farm energy use (including establishing renewable fuels demonstration farms or a fossil fuel tax for off-road use)	M	NEG-L			
5.2	On-farm energy efficiency including improved grain dryers, heat exchangers (dairy), electric motors, energy efficient building design	L	L			

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Jobs, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes/Related Actions in Iowa
5.3	Promotion of farming practices that achieve GHG benefits	L	L			
5.4	Programs to support local farming/buy local	L-M	?			
5.5	Reduction of fossil-based products and energy in agricultural activities	?	?			
AFW-6	FORESTRY—PRODUCTION OF FUELS AND ELECTRICITY					
6.1	Expanded use of forest biomass feedstocks for electricity, heat, and steam production	M	L-H			
6.2	In-state liquid biofuels production	M	L-M			
6.3	Improved energy capture from wood waste combustion	L	?			
6.4	Improved commercialization of biomass gasification and combined cycle	L	U			
AFW-7	FORESTRY—BIOMASS PROTECTION AND MANAGEMENT					
7.1	Forest protection—reduced clearing and conversion to non-forest cover	M-H	M			McKinsey Report: Forest Management: \$23/ton
7.2	Urban forestry	M	M-H			

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Jobs, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes/Related Actions in Iowa
7.3	Afforestation and/or restoration of non-forested lands	M-H	M			McKinsey Report: Afforestation pastureland: \$18/ton and Afforestation cropland: \$39/ton
7.4	Forest management for carbon sequestration	M	M			
7.5	Mitigation of forest carbon sequestration loss and emissions due to wildfire	L	?			
7.6	Mitigation of forest loss due to insects/disease	M	?			
7.7	Management of wetlands to improve sequestration and/or reduce associated methane emissions	?	?			How does this differ from 4.5?
AFW-8	FORESTRY—WOOD PRODUCTS AND WASTE					
8.1	Improved mill waste recovery	L	L			
8.2	Improved logging residue recovery	L	U			
8.3	Expanded use of wood products for building materials (emphasizing the benefits associated with durable wood products: less energy intensive than steel and concrete and additional sequestration)	M	?			
8.4	Forestry biochar	?	?			

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Jobs, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes/Related Actions in Iowa
AFW-9	WASTE MANAGEMENT—WASTE MANAGEMENT STRATEGIES					
9.1	Advanced recycling and composting	M-H	L-M			
9.2	Promotion of bioreactor technology (advanced municipal solid waste management practices)	M-H	L			
9.3	Source reduction strategies	M-H	?			
9.4	Resource management contracting	L	?			
9.5	Waste coal recapture	?	?			
9.6	Enhanced management of organic waste	M	M			
9.7	Promotion of new and existing technologies for waste energy conversion	L-H	??			
9.8	Reduce residential waste burning, including organic waste	L	L			
9.9	Improve waste collection efficiencies	?	?			
AFW-10	WASTE MANAGEMENT—LANDFILL GAS STRATEGIES					
10.1	Flare landfill methane at non-NSPS (smaller) sites	L	H			
10.2	Methane and biogas energy programs	M	M-H			

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Jobs, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes/Related Actions in Iowa
10.3	Landfill methane energy programs	M-H	Neg-L			
AFW-11	WASTE MANAGEMENT—WASTEWATER MANAGEMENT ACTIVITIES					
11.1	Energy efficiency improvements	M	Neg-L			
11.2	Lower waste processing needs (lower water consumption, waste production)	L	??			
11.3	Install digesters and turbines or engines	L-M	L			
11.4	Restoration of soil organic carbon from application of WWTP biosolids	L-M	??			
11.5	Heat recovery	L	??			
11.6	Algae and bio-oils	M-H	??			