

Catalog of State Actions Agriculture, Forestry, and Waste Management Working Group

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 Tables that Follow:

Potential GHG Emission Reductions <u>1/</u>	Potential Cost or Cost Savings <u>1/ 2/</u>
High (H): At least 1.0 million metric tons (MMt) carbon dioxide equivalent (CO ₂ e) per year by 2020	High (H): \$50 per metric ton CO ₂ e (tCO ₂ e) or above
Medium (M): From 0.1 to 1.0 MMtCO ₂ e per year by 2020	Medium (M): \$5-50/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 \$5/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
<p><u>1/</u> Several measures may overlap in terms of emissions reductions and/or cost impacts. Estimates assume measures would be implemented independently from other measures.</p> <p><u>2/</u> Costs are denoted by a positive number. Cost savings (i.e., “negative costs”) are denoted by a negative number.</p>	

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.

Notation of Options:

* **Options marked in bold an asterisk (*)** indicate some of the related state actions that are approved or underway, as described further in the companion options description document. TWG members are encouraged to provide information on other relevant actions.

Agriculture, Forestry, and Waste Management (AFW)

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 MD
AFW-1 AGRICULTURE – PRODUCTION OF ENERGY						
1.1	Expanded Use of Biomass Feedstocks for Energy Production	L-M	M	Need to identify viable feedstocks; could include residues as well as energy crops. Poultry waste a potentially important MD feedstock.		Renewable Portfolio Standard; Renewable Electricity Production Credit Note linkage to biomass energy option in forestry sector.
1.2	In-state Liquid Biofuels Production	M-H	M-H	Includes purpose-grown crops (e.g. switchgrass) as well as traditional starch and oil production crops. Cost dependent on design of incentives program/other implementation mechanisms		Renewable Fuels Incentive Act; Renewable Fuels Taskforce; biodiesel mixing station on the lower shore in MD Note linkage to biofuels options in forestry and waste sectors.
1.3	Manure Digesters/Other Waste Energy Utilization	L-M	M-H			Clean Energy Incentive Act Note: Currently there are no digesters in MD. Linked with Option 2.1 below; also potential linkage to organic waste management (Option 9.6)
AFW-2 AGRICULTURE – LIVESTOCK						
2.1	Manure Management (manure utilization/methane capture)	L	L	May not be sufficient scientific basis supporting N ₂ O reductions		Clean Energy Incentive Act
2.2	Changes in Animal Feed	L	L-M			
2.3	Rotational Grazing (Improve	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 MD
	Grazing Crops and/or Management)					
2.4	Utilize Biofilters to Control CAFO Emissions	L	?			
2.5	Increase Pasturing and Lower Densities	L	?			MD Nutrient Management Act
AFW-3	AGRICULTURE – CROP PRODUCTION					
3.1	Soil Carbon Management	M	L	Additional?		MD funding assistance is available.
3.2	Advanced Nutrient Management	L-M	L			A Nutrient Management Plan is required by MD Nutrient Management Act (1998). MD Department of Ag to provide recommendations on options for nutrient trading this fall.
3.3	Technology Improvements to Increase Efficiency	L	?			
3.4	Water Management	L	L			
AFW-4	AGRICULTURE – LAND USE CHANGE					
4.1	Land Use Management that Promotes Grassland Cover	L	L	Available land could be limited		MD does not participate in the Conservation Reserve Program (CRP) but rather in the Conservation Reserve Enhancement Program (CREP).
4.2	Preserve Open Space/Agricultural Land	L	M-H	Difficult to quantify additional indirect benefits from more efficient development. Reductions may vary depending on above and below ground carbon levels and level of VMT reduction achieved		MD has a many diverse open space initiatives - over \$200 mil/yr.

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 MD
AFW-5	AGRICULTURE – FARMING PRACTICES					
5.1	Reductions in On-Farm Energy Use	L	Neg-L			Clean Energy Incentive Act; Farm Energy Audit Program; State Transportation Initiatives
5.2	Promotion of Farming Practices that Achieve GHG Benefits	L	?			Could include organic farming methods that have been shown to produce net GHG benefits
5.3	Programs to Support Local Farming/Buy Local	L-M	?	Difficult to fully account for benefits and costs		MD Dept of Ag Buy Local program.
AFW-6	FORESTRY – PRODUCTION OF ENERGY IN FORESTRY AND URBAN TREE MANAGEMENT					
6.1	Expanded Use of Forest Biomass Feedstocks for Electricity, Heat and Steam Production	M-H	L-M	costs vary dramatically depending on implementation mechanisms		
6.2	In-state Liquid Biofuels Production	L-H	?	Benefit dependent on amount of residue diverted to fuel		Renewable Fuels Incentive Act
6.3	Improved Energy Capture from Wood Waste Combustion	L-M	L-M	Reductions depend on available acreage, technology employed and distance to end use		
6.4	Improved Commercialization of Biomass Gasification and Combined Cycle	U	?	Reductions dependent on assumed technology penetration; costs dependent on structure of incentives program		
AFW-7	FORESTRY – BIOMASS PROTECTION AND MANAGEMENT					
7.1	Forest Protection – Reduced Clearing And Conversion to Non-forest Cover	M-H	M		Priority Combine with 4.2	
7.2	Urban Forestry	L-M	L-M	Many ancillary benefits		MD SIP; New ozone

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 MD
				including improved or maintained quality of life for people in improved urban forests as well as wildlife, recreation and watershed improvements		mitigation voluntary measure
7.3	Afforestation/Reforestation	M-H	L-M			Forest Conservation Act; RGGI.
7.4	Forest Management for Carbon Sequestration	M	L-M			
7.5	Mitigation of Forest Carbon Sequestration Loss and Emissions Due to Wildfire	L	L			This option is of less concern than 7.6.
7.6	Mitigation of Forest Loss Due to Insects/Disease	L	L-M			More significant problems have been invasive species and pests.
AFW-8	FORESTRY – WOOD PRODUCTS AND WASTE					
8.1	Improved Mill Waste Recovery – Utilization of Sawmill Residues & Emissions	L	L			Not much opportunity to increase use of residues. Most residues currently used although maybe not for energy.
8.2	Improved Wood Waste and Logging Residue Recovery	L	L			
8.3	Expanded Use of Wood Products for Building Materials	L-M	?			
8.4	Reduction in Logging Industry Energy Use	L	L-M			Draft nominal cost rating assumed to parallel AFW 5.1
8.5	Programs to Support Buying Local Wood Products	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 MD
AFW -9	WASTE MANAGEMENT – WASTE MANAGEMENT STRATEGIES					
9.1	Advanced Recycling	M-H	L-M	Reductions capture landfill emissions and energy reductions for the use of recycled products versus those from raw materials; reductions occur both within and outside MD		
9.2	Promotion of Bioreactor Technology (Advanced Municipal Solid Waste Management Practices)	L-M	L-M			Clean Energy Incentive Act
9.3	Source Reduction Strategies	L-M	L			
9.4	Resource Management Contracting	?	?			
9.5	Waste Coal Recapture	?	?			
9.6	Enhanced Management of Organic Waste	M	L-M	Reductions occur at landfill and also via use of energy if organics are used to generate biogas		Note potential linkage to Option 1.3.
9.7	Promotion of New & Existing Technologies for Waste Energy Conversion	L-M	?	Benefits dependent on penetration of new/existing technologies; costs dependent on structure of incentives program.		Clean Energy Incentive Act
AFW -10	WASTE MANAGEMENT – LANDFILL GAS STRATEGIES					
10.1	Flare Landfill Methane at non-NSPS (smaller) Sites	M-H	M-H	Technical feasibility of collecting and controlling methane at some sites is questionable		
10.2	Methane and Biogas Energy Programs	?	M-H			Clean Energy Incentive Act
10.3	Landfill Methane Energy	M	Neg-L	Collection and control could		Clean Energy Incentive Act

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 MD
	Programs			occur at sites currently flared or at uncontrolled sites.		
AFW-11	WASTE MANAGEMENT – WASTEWATER ACTIVITIES					
11.1	Energy Efficiency Improvements	L	Neg-L			RGGI
11.2	Lower Waste Processing Needs (lower water consumption, waste production)	L	?	Costs are industry and technology specific		
11.3	Install Digesters and Turbines or Engines	L-M	M			Clean Energy Incentive Act
11.4	Restoration of Soil Organic Carbon from Application of WWTP Biosolids	L	?			Note linkage to agricultural soil carbon option (3.1).
11.5	Heat Recovery	L	?			
11.6	Algae and Bio-oils	L	?			Note linkage to the agriculture and forestry biofuels options.