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## Catalog of State Actions Agriculture, Forestry and Waste Management (AFW) Issues Working Group

### DRAFT

A catalog of state-level, GHG-reducing actions and policy options prepared by the Center for Climate Strategies (CCS), Maryland Department of Environment, and others based on actions undertaken or considered by Maryland and other states, including regional, state, local and private actions.

***Important Note: The GHG Reduction Policy Options below are numbered solely for convenience in referencing them. Their numbers do NOT reflect a ranking or prioritization of the policy options.***

#### Notation regarding options:

- Options marked with an asterisk (\*) indicate options that are at least partially “base case” policies, i.e., that have been considered or undertaken at some level in Maryland.
- TWG recommendations for priority are indicated in the Priority for Analysis column.

**Key to Future Rankings of Options in the Tables that Follow:**

<b>Potential GHG Emission Reductions <u>1/</u></b>	<b>Potential Cost or Cost Savings <u>1/ 2/</u></b>
<b>High (H):</b> At least 1.0 million metric tons (MMt) carbon dioxide equivalent (CO <sub>2</sub> e) per year by 2020	<b>High (H):</b> \$50 per metric ton CO <sub>2</sub> e (tCO <sub>2</sub> e) or above
<b>Medium (M):</b> From 0.1 to 1.0 MMtCO <sub>2</sub> e per year by 2020	<b>Medium (M):</b> \$5-50/tCO <sub>2</sub> e
<b>Low (L):</b> Less than 0.1 MMtCO <sub>2</sub> e per year by 2020, or 1 MMtCO <sub>2</sub> e by 2050	<b>Low (L):</b> Less than \$5/tCO <sub>2</sub> e
<b>Uncertain (U):</b> Not able to estimate at this time	<b>Negative (Neg):</b> Net cost savings
	<b>Uncertain (U):</b> Not able to estimate at this time
<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.	
<u>2/</u> 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.

### 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
<b>AFW-1 AGRICULTURE – PRODUCTION OF FUELS AND ELECTRICITY</b>						
1.1	Expanded Use of Biomass Feedstocks for Energy				Priority consider as one option	Renewable Portfolio Standard; Renewable Electricity Production Credit
1.1.1	In-state Liquid Biofuels Production				Priority	Renewable Fuels Incentive Act; Renewable Fuels Taskforce; biodiesel mixing station on the lower shore in MD
1.1.2	Manure Digesters/Other Waste Energy Utilization				Priority	Clean Energy Incentive Act Note: Currently there are no digesters in MD.
<b>AFW-2 AGRICULTURE – LIVESTOCK</b>						
2.1	Manure Management (manure utilization/methane capture)					Clean Energy Incentive Act
2.2	Changes in Animal Feed					
2.3	Rotational Grazing (Improve Grazing Crops and/or Management)					
2.4	Utilize Biofilters to Control CAFO Emissions					
2.5	Increase Pasturing and Lower Densities					MD Nutrient Management Act

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<b>AFW-3 AGRICULTURE – CROP PRODUCTION</b>						
3.1	Soil Carbon Management					MD funding assistance is available.
3.2	Advanced Nutrient Management					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					
3.4	Water Management					
3.5	Drainage Management				Not germane	
<b>AFW-4 AGRICULTURE – LAND USE CHANGE</b>						
4.1	Land Use Management that Promotes Grassland Cover					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				Priority Combine with 7.1	MD has a many diverse open space initiatives - over \$200 mil/yr.
<b>AFW-5 AGRICULTURE – FARMING PRACTICES</b>						
5.1	Reductions in On-Farm Energy Use					Clean Energy Incentive Act; Farm Energy Audit Program; State Transportation Initiatives
5.2	Promotion of Farming Practices that Achieve GHG Benefits					

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
5.3	Programs to Support Local Farming/Buy Local					MD Dept of Ag Buy Local program.
<b>AFW-6</b>	<b>FORESTRY – PRODUCTION OF FUELS AND ELECTRICITY IN FORESTRY AND URBAN TREE MANAGEMENT</b>					
6.1	Expanded Use of Forest Biomass Feedstocks for Electricity, Heat and Steam Production					
6.2	In-state Liquid Biofuels Production					Renewable Fuels Incentive Act
6.3	Improved Energy Capture from Wood Waste Combustion					
6.4	Improved Commercialization of Biomass Gasification and Combined Cycle					
<b>AFW-7</b>	<b>FORESTRY – BIOMASS PROTECTION AND MANAGEMENT</b>					
7.1	Forest Protection – Reduced Clearing And Conversion to Non-forest Cover				Priority Combine with 4.2	
7.2	Urban Forestry					MD SIP; New ozone mitigation voluntary measure
7.3	Afforestation/Reforestation					Forest Conservation Act; RGGL.
7.4	Forest Management for Carbon Sequestration				Priority	

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7.5	Mitigation of Forest Carbon Sequestration Loss and Emissions Due to Wildfire					This option is of less concern than 7.6.
7.6	Mitigation of Forest Loss Due to Insects/Disease					More significant problems have been invasive species and pests.
<b>AFW-8</b>	<b>FORESTRY – WOOD PRODUCTS AND WASTE</b>					
8.1	Improved Mill Waste Recovery – Utilization of Sawmill Residues & Emissions					Not much opportunity to increase use of residues. Most residues currently used although maybe not for energy.
8.2	Improved Logging Residue Wood Waste Recovery					
8.3	Expanded Use of Wood Products for Building Materials					
8.4	Reduction in Logging Industry Energy Use				parallel AFW 5.1	
8.5	Programs to Support Buying Local Wood Products					
<b>AFW -9</b>	<b>WASTE MANAGEMENT – WASTE MANAGEMENT STRATEGIES</b>					
9.1	Advanced Recycling					
9.2	Promotion of Bioreactor Technology (Advanced Municipal Solid Waste Management Practices)					Clean Energy Incentive Act
9.3	Source Reduction Strategies					
9.4	Resource Management Contracting					

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9.5	Waste Coal Recapture					
9.6	Enhanced Management of Organic Waste					
9.7	Promotion of New & Existing Technologies for Waste Energy Conversion					Clean Energy Incentive Act
<b>AFW -10</b>	<b>WASTE MANAGEMENT – LANDFILL GAS STRATEGIES</b>					
10.1	Flare Landfill Methane at non-NSPS (smaller) Sites					
10.2	Methane and Biogas Energy Programs					Clean Energy Incentive Act
10.3	Landfill Methane Energy Programs					Clean Energy Incentive Act
<b>AFW-11</b>	<b>WASTE MANAGEMENT – WASTEWATER ACTIVITIES</b>					
11.1	Energy Efficiency Improvements					RGGI
11.2	Lower Waste Processing Needs (lower water consumption, waste production)					
11.3	Install Digesters and Turbines or Engines					Clean Energy Incentive Act
11.4	Restoration of Soil Organic Carbon from Application of WWTP Biosolids					
11.5	Heat Recovery					
11.6	Algae and Bio-oils					