

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

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*	Potential Cost or Cost Savings**†
<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

\*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.

#### Notation of Options:

\* **Options marked in bold and asterisk (\*)** indicate some of the related state actions that are approved or underway, as described further in the companion options description document. Subcommittee 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/ Cost Savings per Ton	Other Factors: Jobs, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in Michigan
<b>AFW-1</b>	<b>AGRICULTURE – PRODUCTION OF ENERGY AND MATERIALS</b>					
1.1	Expanded Use of Biomass Feedstocks for Electricity, Heat, Steam Production					MI's Biomass Energy Program encourages use of biomass for energy through grants, partnerships, and policies. Michigan Department of Agriculture (MDA) has provided outreach to expand awareness and availability of renewable energy generating treatment technologies. DEQ promotes RE through E&O, P2 programs, loans and AgriEnergy conference.
1.2	In-state Liquid Biofuels and Feedstock Production					MI Renewable Fuels Commission created to promote alt fuels. MI Renaissance zones offer tax incentives to renewable energy production facilities. Several new biofuel facilities are being located in MI.
1.3	Manure Digesters/Other Waste Energy Utilization					MI Biomass Energy Program funded an Ag Dept study on anaerobic digestion byproducts. Michigan Department of Agriculture has provided outreach to expand awareness and availability of renewable energy generating treatment technologies. Promotion through AgriEnergy conference.

1.4	Improving Energy Capture from Corn and Biomass Heat					
1.5	Expand Use of Bio-based Materials					Promotion through AgriEnergy conference.
<b>AFW-2</b>	<b>AGRICULTURE – LIVESTOCK</b>					
2.1.1	Manure Management: Manure Utilization					
2.1.2	Manure Management: Methane Capture					MI Ag Dept allows landowners to earn credits through installing methane digesters and offers training certification for operators of Anaerobic Digester Systems.
2.2	Changes in Animal Feed					
2.3	Rotational Grazing/Improve Grazing Crops and/or Management					USDA-Natural Resources Conservation Service (NRCS) offers a variety of cost-share programs for producers who improve system management.
2.4	Utilize Bio-filters to Control CAFO Emissions					
2.5	Increase Pasturing and Lower Densities					The Federal Farm Bill offers a variety of cost share programs for landowners implementing NRCS practices.
2.6	Consolidation of Livestock for Efficiency Gains					

2.7	Technology Improvements to Increase Water Conservation					
<b>AFW-3</b>	<b>AGRICULTURE – CROP PRODUCTION</b>					
3.1	Soil Carbon Management					MI landowners earn credits through conservation practices such as no-till and strip-till. The Federal Farm Bill offers a variety of cost share programs for landowners implementing NRCS practices.
3.2	Nutrient Management					The Federal Farm Bill offers a variety of cost share programs for landowners implementing NRCS practices.
3.3	Technology Improvements to Increase Efficiency					The Federal Farm Bill offers a variety of cost share programs for landowners implementing NRCS practices.
3.4	Water Management					The Federal Farm Bill offers a variety of cost share programs for landowners implementing NRCS practices.
3.5	Drainage Management					1.5 million acres impacted by drain maintenance and petition projects annually to improve drainage. The Federal Farm Bill offers a variety of cost share programs for landowners implementing NRCS practices.
<b>AFW-4</b>	<b>AGRICULTURE – LAND USE CHANGE</b>					

4.1	Land Use Management that Promotes Grassland Cover					MI landowners earn credits for grass planting and increasing amount of stored carbon on conservation lands. The Federal Farm Bill offers a variety of cost share programs for landowners implementing NRCS practices.
4.2	Preserve Open Space/Agricultural Land					MI protects more than 3,350,000 acres of farmland through easement grants.
4.3	Consolidation of Farm Land					
<b>AFW-5</b>	<b>AGRICULTURE – FARMING PRACTICES</b>					
5.1	Increase On-Farm Energy Efficiency					DEQ funded MSU's development of the Dairy Farm Energy Efficiency Audit Program.
5.2	Promotion of Farming Practices that Achieve GHG Benefits					MI Ag. Environmental Assurance Program (MAEAP) teaches farmers to prevent environmental risk. The Federal Farm Bill offers a variety of cost share programs for landowners implementing NRCS practices.
5.3	Programs to Support Local Farming/Buy Local					MI Food Policy Council, MIFFS, and various organizations encourage local & sustainable food growth and farm markets.

5.4	Programs to Promote Organic Farming Practices that Achieve GHG Benefits					<p><b><i>NOTE: Opposition to this option was expressed by TWG members who do not believe that organic practices should be encouraged over other GHG-reducing farm practices.</i></b></p> <p>MSU has demonstration organic farm.</p>
5.5	Promotion of Urban Agriculture, Community Gardens, and Green Roofs					<p>MIFFS, Saginaw Bay WIN, MSUE Master Gardeners and some local cities – Detroit, Grand Rapids, Saginaw and Flint – promote and demonstrate urban agriculture.</p>
<b>AFW-6</b>	<b>FORESTRY – PRODUCTION OF ENERGY AND MATERIALS</b>					
6.1	Expanded Use of Forest Biomass Feedstocks for Electricity, Heat and Steam Production					See option 1.1.
6.2	In-state Liquid Biofuels Production					See option 1.2.
6.3	Improved Energy Capture from Wood Waste Combustion					
6.4	Improved Commercialization of Biomass Gasification and Combined Cycle					
6.5	Expanded Use of New, Used, & Recycled Wood Products for Building Materials					

<b>AFW-7 FORESTRY – BIOMASS PROTECTION AND MANAGEMENT</b>						
7.1	Forest Protection – Reduced Clearing and Conversion to Non-forest Cover					MI landowners earn credits by increasing carbon stored on non-industrial working forests.
7.2	Urban Forestry					
7.3	Afforestation and/or Restoration of Non-forested Lands					MI landowners earn credits for afforestation/reforestation and tree planting.
7.4	Forest Management for Carbon Sequestration and Biodiversity					MI landowners earn credits through reforesting degraded forest land.
7.5	Mitigation of Forest Carbon Sequestration Loss and Emissions Due to Wildfire					
7.6	Mitigation of Forest Loss Due to Insects/Disease					
<b>AFW-8 FORESTRY – WOOD PRODUCTS AND WASTE</b>						
8.1	Improved Mill Waste Recovery					
8.2	Improved Logging Residue Recovery					
8.3	Silviculture Improvements					

<b>AFW-9 WASTE MANAGEMENT – WASTE MANAGEMENT STRATEGIES</b>						
9.1	Advanced Recycling, Source Reduction, and Composting					Mandated recycling of office paper by State Government.
9.2	Promotion of Bioreactor Technology (Advanced Municipal Solid Waste Management Practices)					
9.3	Resource Management Contracting					
9.4	Enhanced Management of Organic Waste					
9.5	Promotion of New & Existing Technologies for Waste Energy Conversion					
<b>AFW -10 WASTE MANAGEMENT – LANDFILL GAS STRATEGIES</b>						
10.1	Flare Landfill Methane at non-NSPS (smaller) Sites					
10.2	Landfill Methane Energy Programs					
<b>AFW-11 WASTE MANAGEMENT – WASTEWATER ACTIVITIES</b>						
11.1	Energy Efficiency Improvements					
11.2	Lower Waste Processing Needs (lower water consumption, waste production)					

11.3	Methane and Biogas Energy Programs					
11.4	Restoration of Soil Organic Carbon from Application of WWTP Bio-solids					
11.5	Heat Recovery					
11.6	Algae and Bio-Oils					