



Catalog of State Actions

Agriculture, Forestry, and Waste Management Technical Work 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 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 2025	High (H): \$50 per metric ton of carbon dioxide equivalent (tCO ₂ e) or above
Medium (M): From 0.1 to 1.0 MMtCO ₂ e per year by 2025	Medium (M): \$5–\$50/tCO ₂ e
Low (L): Less than 0.1 MMtCO ₂ e per year by 2025, or 1.0 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

* Several measures may overlap in terms of emission reductions and/or cost impacts. Estimates assume measures would be implemented independently of 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 Emission Reductions	Cost per Ton	Other Considerations: Jobs, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes/Related Actions in Kansas
AFW-1	AGRICULTURE—PRODUCTION OF ENERGY AND MATERIALS					
1.1	Expanded Utilization of Biomass Feedstocks for Electricity, Heat, or Steam Production*					<ul style="list-style-type: none"> • Westar released an RFP for 500 megawatts (MW) of renewable energy. • Executive Order 08-04: Kansas Energy Council (KEC) instructed to collect and compile information on available and currently utilized renewable energy resources in Kansas. • Potential Project - Sunflower Integrated Bioenergy Center, producing electricity using methane from anaerobic digestion of manure, as well as by-products of biodiesel and ethanol production.

Option No.	GHG Reduction Policy Option	Potential GHG Emission Reductions	Cost per Ton	Other Considerations: Jobs, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes/Related Actions in Kansas
1.2	In-state Liquid Biofuels Production*					<ul style="list-style-type: none"> • Bioenergy Research Grant Program recommended to spur development of cost-efficient renewable fuels. Goal for Kansas to produce 20% of nation's alternative fuel needs. • Potential Project - Sunflower Integrated Bioenergy Center, producing ethanol and biodiesel in a closed-loop process that includes an algae reactor and reuses many of the by-products from the fuel-making process. • Cellulosic research facility in Hugoton.
1.3	Manure Digesters/Other Waste Energy Utilization					
1.4	Integrated Bioenergy Production					<p>Potential Project - Sunflower Integrated Bioenergy Center, producing electricity methane from anaerobic digestion of manure, as well as by-products of biodiesel and ethanol production.</p>

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1.5	Improving Energy Capture From Corn and Biomass Heat					
1.6	Expand Production/Use of Bio-Based Materials and Chemicals					
1.7	Improved Commercialization of Biomass Conversion Technologies					
1.8	Bioenergy Research					The Biosciences Authority is a potential source of funding.
AFW-2	AGRICULTURE—LIVESTOCK					
2.1	Manure Management and Utilization					
2.2	Changes in Animal Feed					
2.3	Technology Improvements to Increase Water Conservation					
2.4	Changes in Livestock (Dairy) Practices to Increase Efficiency					
AFW-3	AGRICULTURE—CROP PRODUCTION					

Option No.	GHG Reduction Policy Option	Potential GHG Emission Reductions	Cost per Ton	Other Considerations: Jobs, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes/Related Actions in Kansas
3.1	Soil Carbon Management*					<ul style="list-style-type: none"> • Kansas State University (KSU) Soil Carbon Center leads research on soil carbon sequestration. Many Kansas farmers involved in no-till practices. • No Till on the Plains Organization • Chicago Climate Exchange has an offset program that includes soil carbon.
3.2	Nutrient Management					
3.3	Technology Improvements to Increase Efficiency					
3.4	Water Management					
3.5	Drainage Management					
3.6	Biotechnology Applications for GHG Mitigation					
3.7	Perennial Crop Production					
AFW-4	AGRICULTURE—LAND-USE CHANGE					
4.1	Land-Use Management That Promotes Permanent Cover – State Action*					<ul style="list-style-type: none"> • This action refers to actions that could be implemented at the state level. • No Till on the Plains Organization

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4.2	Land-Use Management That Promotes Permanent Cover – State Input on Federal Policy					<ul style="list-style-type: none"> This action refers to influencing federal policy on land use management.
4.3	Preserve Open Space/Agricultural Land					<p>Kansas mayors agree to adopt and enforce land-use policies that reduce sprawl, preserve open space, and create compact, walkable, urban communities.</p> <p>State funding is a limiting factor; brownfields development can lower pressure to convert other open space/agricultural lands.</p> <p>Kansas Land Trust</p>
4.4	Prioritize Environmental Remediation Actions for GHG Benefits					<p>A relevant example is the re-vegetation of disturbed lands to improve carbon sequestration.</p>
AFW-5	AGRICULTURE—FARMING PRACTICES					
5.1	Increase On-Farm Energy Production and Efficiency*					
5.2	Promotion of Farming Practices That Achieve GHG Benefits					<p>Organic farming could be included as an example here; however there is conflicting evidence of net GHG benefits.</p>

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5.3	Programs To Support Local Farming/Buy Local					
5.4	Promotion of Urban Agriculture, Community Gardens, Green Roofs, and Locally-Sourced School Foods					
AFW-6 RANGELAND & FORESTRY—PRODUCTION OF ENERGY AND MATERIALS						
6.1	Expanded Use of Rangeland & Forest Biomass Feedstocks for Electricity, Heat, and Steam Production*					<ul style="list-style-type: none"> Westar released an RFP for 500 MW of renewable energy. Executive Order 08-04: KEC instructed to collect and compile information on available and currently utilized renewable energy resources in Kansas.
6.2	In-State Liquid Biofuels Production*					<ul style="list-style-type: none"> Bioenergy Research Grant Program recommended to spur development of cost-efficient renewable fuels. Goal for Kansas to produce 20% of nation's alternative fuel needs.
6.3	Improved Energy Capture from Wood Waste Combustion					

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6.4	Improved Commercialization of Biomass Conversion Technologies					
6.5	Expanded Use of New, Reused, and Recycled Wood Products for Building Materials					
AFW-7	RANGELAND & FORESTRY—BIOMASS PROTECTION AND MANAGEMENT					
7.1	Rangeland & Forest Protection—Reduced Clearing and Conversion to Non-Forest Cover					
7.2	Urban Forestry*					<ul style="list-style-type: none"> Kansas mayors agree to maintain healthy urban forests, promote tree planting, and increase shading.
7.3	Afforestation and/or Restoration of Non-Forested Lands					
7.4	Rangeland & Forest Management for Carbon Sequestration					
7.5	Mitigation of Carbon Sequestration Loss and Emissions Due to Wildfire					
7.6	Mitigation of Forest Loss Due to Insects/Disease					

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AFW-8	RANGELANDS & FORESTRY—BIOMASS INDUSTRY					
8.1	Improved Mill Waste Recovery—Utilization of Sawmill Residues and Emissions					Limited potential in KS.
8.2	Improved Logging Residue Recovery					Limited potential in KS.
8.3	Silviculture Improvements					
AFW-9	WASTE MANAGEMENT—WASTE MANAGEMENT STRATEGIES					
9.1	Expanded Use of MSW Waste Biomass Feedstocks for Electricity, Heat, and Steam Production*					<ul style="list-style-type: none"> Westar released a request for proposals (RFP) for 500 MW of renewable energy. Executive order 08-04: KEC instructed to collect and compile information on available and currently utilized renewable energy resources in Kansas.
9.2	In-State Liquid Biofuels Production*					<ul style="list-style-type: none"> Bioenergy Research Grant Program recommended to spur development of cost-efficient renewable fuels. Goal for Kansas to produce 20% of nation's alternative fuel needs.

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9.3	Advanced Recycling and Composting					
9.4	Promotion of Bioreactor Technology (Advanced Municipal Solid Waste Management Practices)					
9.5	Source Reduction Strategies					
9.6	Resource Management Contracting					
9.7	Enhanced Management of Organic Waste					
9.8	Improved Commercialization of Biomass Conversion Technologies					
AFW-10	WASTE MANAGEMENT—LANDFILL GAS STRATEGIES					
10.1	Flare Landfill Methane at Non-NSPS (Smaller) Sites					
10.2	Methane and Biogas Energy Programs*					<ul style="list-style-type: none"> Kansas mayors agree to increase use of clean renewable energy, such as landfill methane and waste-to-energy technology.
10.3	Landfill Methane Energy Programs					
AFW-11	WASTE MANAGEMENT—WASTEWATER MANAGEMENT ACTIVITIES					

Option No.	GHG Reduction Policy Option	Potential GHG Emission Reductions	Cost per Ton	Other Considerations: Jobs, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes/Related Actions in Kansas
11.1	Wastewater Treatment Plant Biosolids for Energy Production*					<ul style="list-style-type: none"> • Kansas mayors agree to explore opportunities to increase pump efficiency and recover wastewater treatment methane for energy production.
11.2	Energy Efficiency Improvements*					<ul style="list-style-type: none"> • KS FCIP responsible for administering grant program aimed at reducing energy use.
11.3	Lower Waste Processing Needs (Lower Water Consumption, Waste Production)					
11.4	Install Digesters and Turbines or Engines					
11.5	Algae and Bio-Oils					
11.6	Use of Wetlands for Energy Efficiency and Carbon Sequestration					