Chapter 7
Agriculture, Forestry, and Waste Management

Overview of GHG Emissions

The agriculture, forestry, and waste management (AFW) sectors are directly responsible for moderate amounts of Arkansas's current greenhouse gas (GHG) emissions. The total AFW contribution to carbon dioxide equivalent (CO_2e) gross emissions in 2005 was 14 million metric tons (MMt), or about 17% of the state's total. The AFW contribution to net emissions in 2005 was –7 $MMtCO_2e$ due to the net sequestration of carbon in the forestry and agriculture sectors. As described in the Inventory and Forecast (I&F) report, it is important to recognize that emissions from fossil fuel consumption within the AFW sectors are included within the residential, commercial, and industrial (RCI) sectors (particularly the industrial sector).

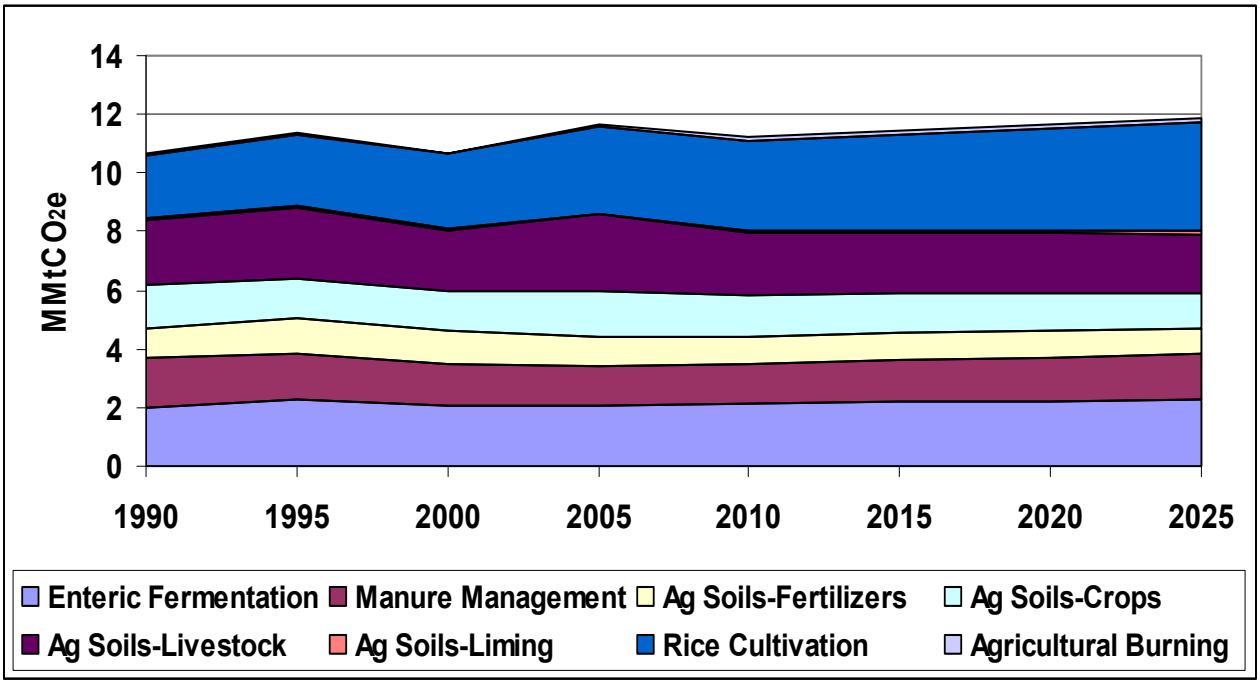
Agricultural emissions include methane (CH_4) and nitrous oxide (N_2O) emissions from enteric fermentation, manure management, agricultural soils management, rice cultivation, and agriculture residue burning. These emissions were estimated to be about 12 $MMtCO_2e$ in 2005. As shown in Figure 7-1, emissions from soil carbon losses from tilling, commercial fertilizer and livestock manure application to soils, rice cultivation, manure management, enteric fermentation, and fertilizer application all make significant contributions to the sector totals. Sector emissions include CO_2 emissions from oxidized soil carbon and application of urea and lime; N_2O emissions from activities that increase nitrogen in the soil, including fertilizer (synthetic, organic, and livestock) application and production of nitrogen-fixing crops (legumes); and CH_4 emissions from rice cultivation.

Rice cultivation is a significant contributor of GHG emissions in Arkansas. Emissions from rice cultivation comprised 20% (2.1 $MMtCO_2e$) of gross agricultural emissions in 1990. This number is projected to increase to 31% (3.70 $MMtCO_2e$) of agricultural emissions by 2025. Agricultural soils emissions are projected to decrease from 1990 to 2025, with 1990 emissions accounting for 45% (4.8 $MMtCO_2e$) of gross agricultural emissions and 2025 emissions estimated to be about 35% (4.2 $MMtCO_2e$) of gross agricultural emissions. Emissions from other agricultural sources are projected to stay relatively constant through 2025.

Forestland emissions refer to the net carbon dioxide flux[1] from forested lands in Arkansas, which account for about 57% of the state's land area. As shown in Table 7-1, U.S. Forest Service (USFS) data suggest that the total flux estimate for Arkansas forests, including all forest pools, fluctuates between –43 $MMtCO_2e$/year (between 1988 and 1995) and –18 $MMtCO_2e$/year (between 1995 and 2005). For the reference case projections (2005–2025), the forest area and carbon densities of forestlands were assumed to remain at the same levels as in 2005. Table 7-2 provides a summary of the estimated flux for the entire forestry and land use sector.

[1] "Flux" refers to both emissions of CO_2 to the atmosphere and removal (sinks) of CO_2 from the atmosphere.

Figure 7-1. Historical and projected gross GHG emissions from the agriculture sector, Arkansas, 1990–2025



$MMtCO_2e$ = million metric tons of carbon dioxide equivalent

Table 7-1. Annual forest carbon fluxes for Arkansas

Forest Pool	1988–1995 Flux ($MMtCO_2$)	1995–2005 Flux ($MMtCO_2$)
Forest carbon pools (nonsoil)	–29.5	–13.5
Soil organic carbon	–8.92	0.36
Harvested wood products	–4.69	–4.69
Totals	**–43.2**	**–17.8**
Totals (excluding soil carbon)	**–34.2**	**–18.2**

Note: Positive number indicates net emission. Based on U.S. Forest Service input, emissions from soil organic carbon are excluded from the forestry sector summary due to a high level of uncertainty.

$MMtCO_2e$ = million metric tons of carbon dioxide equivalent.

Table 7-2. Forestry and land use flux and reference case projections ($MMtCO_2e$)

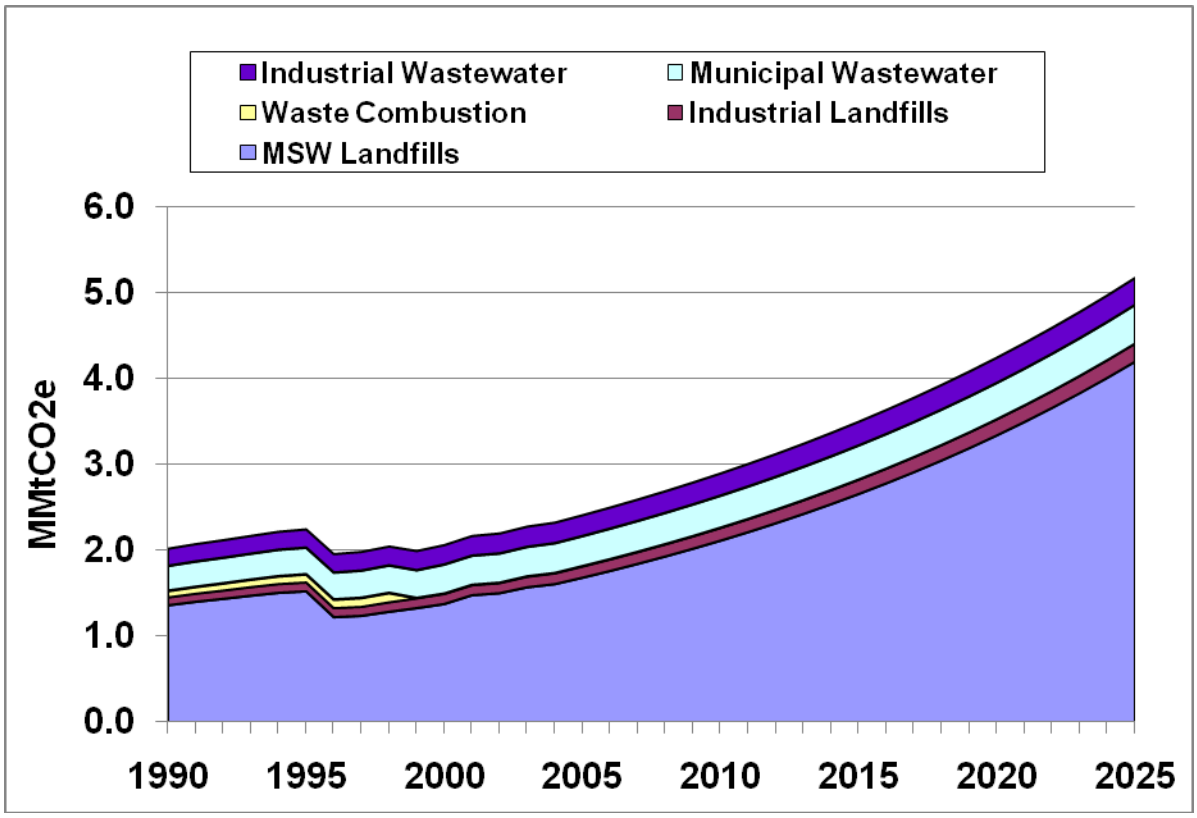
Subsector	1990	2000	2005	2010	2020	2025
Forested landscape (excluding soil carbon)	–34.2	–18.2	–18.2	–18.2	–18.2	–18.2
Forest fires and prescribed burns	0.17	0.18	0.18	0.18	0.18	0.18
Urban forestry and land use	–2.43	–0.83	–0.91	–0.91	–0.91	–0.91
Sector Total	**–36.5**	**–18.8**	**–18.9**	**–18.9**	**–18.9**	**–18.9**

$MMtCO_2e$ = million metric tons of carbon dioxide equivalent

Note: Positive numbers indicate net emission.

Figure 7-2 shows estimated historical and projected emissions from the management and treatment of solid waste and wastewater. Emissions from waste management consist largely of CH_4 emitted from landfills, while emissions from wastewater treatment include both CH_4 and N_2O. Emissions are also included for municipal solid waste (MSW) combustion. Figure 7-2 illustrates that emissions from MSW landfills are projected to increase significantly through 2025. Overall, the waste management sector accounts for less than 5% of Arkansas's total gross emissions per year from 1990 through 2025.

Figure 7-2. Estimated historical and projected emissions from waste and wastewater management in Arkansas



$MMtCO_2e$ = million metric tons carbon dioxide equivalent; MSW = municipal solid waste.

Opportunities for GHG mitigation in the AFW sector involve measures that can reduce emissions within the sector or in other sectors. Examples of reductions that can occur within the sector include changes in crop management practices that reduce GHG emissions by building soil carbon (indirectly sequestering carbon from the atmosphere); more efficient nutrient application (reducing N_2O emissions—note that emissions outside of the AFW sectors are also reduced here due to the embedded energy in nutrients and the potential for lower energy consumption during their application); reforestation projects that achieve GHG reductions by increasing the carbon sequestration capacity of the state's forests; and landfill gas collection and control, which reduces methane emissions from landfills.

For GHG reductions outside of the AFW sector, actions taken within the sector, such as production of liquid biofuels, can offset emissions in the transportation sector, while biomass

energy can reduce emissions in the energy supply (ES) and RCI sectors. Similarly, actions that promote solid waste reduction or recycling can reduce emissions within the AFW sectors (future landfill CH_4), as well as emissions associated with the production of recycled products (recycled products often require less energy to produce than similar products from raw materials). Finally, urban forestry projects can reduce energy consumption within buildings through shading and wind protection.

Following are primary opportunities for GHG mitigation identified by the Governor's Commission on Global Warming (GCGW).

- **Manure management:** Implementing improved manure handling and storage programs, practices, and technologies can reduce CH_4 and N_2O emissions from dairy, hog, and poultry operations. A variety of sources were considered in attempting to quantify the best manure management practices to reduce GHG emissions. While it is very likely that manure management can reduce emissions, the maximum achievable level of emissions reduction is uncertain.
- **Farming practices that achieve GHG benefits:** Implementing programs that incentivize growers to utilize cultivation practices that build soil carbon and reduce nutrient consumption can indirectly sequester CO_2 from the atmosphere. New technologies in the area of precision agriculture offer opportunities to reduce nutrient application and fossil fuel consumption.
- **Improving management of water resources:** Enhancing current capabilities/capacities of storing surface water, can make it is available at appropriate times and in the necessary quantities to reduce pumping and energy consumption, in addition to other ancillary benefits.
- **Expanded use of forest and agricultural biomass:** Expanding use of biomass energy from residue removed from forested areas during treatments to reduce fire risk, crop residues, and purpose-grown crops, and from livestock manure/poultry litter can achieve GHG benefits by offsetting fossil fuel consumption (to produce either electricity or heat/steam). Programs to expand sustainably procured biomass fuel production will most likely be needed to supply a portion of the fuel mix for the renewable energy goals under ES and RCI.
- **Production of advanced liquid biofuels:** Producing renewable fuels, such as ethanol from energy crops, crop residue, forestry residue, or municipal solid waste and biodiesel from crop seed oils, can produce significant reductions when they are used to offset consumption of fossil fuels (e.g., gasoline and diesel in the Transportation and Land Use [TLU] and RCI sectors). This is particularly true when these fuels are produced using processes and/or feedstocks that emit much lower GHG emissions than those from conventional sources (e.g., corn-based ethanol or soy-based biodiesel).
- **Expanded use of locally produced farm and forest products:** Continually promoting farmers' markets in the state, along with using locally sourced wood products with lower embodied energy than other potentially imported building materials, provides benefits through lower associated transportation emissions and lower embodied GHGs.
- **Enhancement/protection of forest carbon sinks:** Through a variety of programs, enhanced levels of CO_2 sequestration can be achieved and carbon can be stored in the state's forest biomass. These programs include reforestation programs, restocking of poorly stocked forests, urban tree programs, wildfire risk reduction, and other forest health programs.

Programs aimed at reducing the conversion of forested lands to nonforest cover will also be important to increase levels of carbon sequestration and to protect the stored carbon in the state's forest biomass.

- **Changes in municipal solid waste management practices:** Concentrating on enhancing the source reduction, recycling, and organics management (e.g., composting practices) in the state can result in significant GHG emission reductions. Also, for waste remaining after full implementation of these "front-end" practices, appropriate GHG-beneficial "end-of-life" practices should be implemented, including enhanced landfill gas collection and utilization.

Key Challenges and Opportunities

Within the forestry sector, Forest Management and Establishment for Carbon Sequestration programs (AFW-7) have the potential to deliver over 12 $MMtCO_2e$/year of GHG reductions in 2025 (see Table 7-2). These programs include forestation, urban forestry, and sustainable forest management (e.g., wildfire reduction, restocking, and forest health approaches) to minimize terrestrial carbon losses, while enhancing carbon sequestration. The overall goal for the forestation recommendation calls for establishing new forest on 500,000 acres by 2025. For the sustainable forest management element, the goals are to achieve carbon benefits on 25% of privately owned land and 17% of publicly owned resource lands by 2025. Appropriate species selection and placement of trees can provide additional benefits through continuity of wildlife habitat, wetland buffers and protection, and adaptation to climate change.

For urban forestry, the goals are to increase urban canopy cover in Arkansas. A strong relationship between all of the related parties is needed (e.g., Arkansas Forestry Commission, utilities, communities, and nongovernmental organizations) to achieve the full goal of 1.7 million new trees in urban areas statewide (or a 4% increase in the number of urban trees).

GCGW recommendation AFW-4 promotes the expanded use of biomass as an energy source for producing electricity, heat, or steam. Use of biomass to supplant fossil fuels was estimated to reduce over 4 $MMtCO_2e$ by 2025. The GCGW conducted a limited assessment of the available biomass resources in the state, which indicated that sufficient resources were available through 2025 to achieve the goals for both the advanced biofuels recommendation (below) and this biomass for energy recommendation. The GCGW noted that the expansion of crops as an energy feedstock needs to ensure that the energy crops are grown on appropriate land and in ways that do not damage terrestrial or aquatic resources or displace food and fiber production. A key challenge to the implementation of this recommendation is the proximity of the feedstock to the end user.

The GCGW found significant opportunity in promoting advanced biofuels production using feedstocks and production methods with superior GHG benefits (e.g., superior to conventional starch-based ethanol). The GCGW adopted the definition of "advanced biofuels" provided by the U.S. Energy Independence and Security Act of 2007: Advanced biofuel "means renewable fuel, other than ethanol derived from corn starch, that has lifecycle GHG emissions, as determined by

the Administrator, after notice and opportunity for comment, that are at least 50 percent less than baseline lifecycle GHG emissions."[2]

It should be noted that there is significant overlap in benefits with the TLU-3 (Advanced Biofuels Development and Expansion) recommendation. However, the GCGW recognizes in-state production and consumption result in the highest benefits. An example of biofuels that could be produced with much better GHG impacts is ethanol from cellulosic hydrolysis of biomass fiber. Feedstocks for the fiber needed for this recommendation could come from crop residue, energy crops, forestry residue, or MSW. A major challenge for the success of AFW-5 is the establishment of a viable commercial-scale cellulosic ethanol or other biofuels industry within the next 5 to 10 years.

Within the agriculture sector, the GCGW recommends programs to promote farming practices that achieve GHG benefits, such as soil management programs that increase soil carbon levels, thereby indirectly sequestering carbon from the atmosphere. These programs, combined with additional measures to promote nutrient efficiency, were estimated to achieve reductions of over 1.5 $MMtCO_2e$ per year by 2025. Programs that would assist farmers in reaching the goals of these recommendations include the encouragement of research and development of farming practices and cropping systems that increase carbon input (e.g., reversion to native vegetation, setting aside agricultural land as grassland, improved crop rotations, yield enhancement measures, organic amendments, cover crops, improved irrigation practices), or decrease carbon output (e.g., proper tillage methods), while maintaining crop yield, so that GHG emissions are reduced.

AFW-8 and AFW-9 provide an integrated set of recommendations for future management of municipal solid waste in Arkansas. AFW-8 focuses on "front-end" waste management technologies: source reduction, recycling, and composting, while AFW-9 focuses on "end-of-use" waste management approaches. The recommendations for AFW-8 represent a continuation of the recycling policy currently in place in Arkansas; increasing the MSW recycling rate for GHG-significant solid waste streams by 2% every 5 years where this is geographically cost-effective. The combined front-end waste management elements produce substantial GHG savings of 4.4 $MMtCO_2e$ in 2025. Source reduction and recycling will result in avoided landfill GHG emissions, as well as avoided product/packaging life-cycle GHG emissions.

Although AFW-8 is estimated to deliver net societal cost savings, successful implementation will require the strengthening of existing (or the introduction of new) recycling legislation, the provision of incentives/subsidies to the municipalities to have more aggressive recycling efforts (currently, it is more expensive to recycle than to landfill), and/or the encouragement of procuring products produced from recycled material. Initial up-front waste management infrastructure investment by communities in the form of material recovery facilities and composting operations may also be required. Cost savings result from avoided landfill fees and the addition of the value of recycled or composted materials. The recommendations provided in AFW-9 are expected to deliver an additional 0.4 $MMtCO_2e$ by 2025.

[2] Library of Congress—Thomas. "Energy Independence and Security Act of 2007." Section 201—Definitions. Available at: http://thomas.loc.gov/home/c110query.html.

In addition to the opportunities and challenges indicated above, it is also important for Arkansas to address the impacts of climate change, including the potential impacts on water resources, ecosystems, habitat, wildlife, and fisheries. These issues are closely linked to many of the mitigation recommendations under the AFW sector, but are specifically considered under the Cross-Cutting Issues recommendations (CC-9: Adaptation and Vulnerability).

Overview of Policy Recommendations and Estimated Impacts

As noted above, the nine policy recommendations for the AFW sector address a diverse array of activities. Taken as a whole, they offer significant cost-effective emission reductions, as shown in Table 7-3.

Figure 7-3 shows the breakdown of the cumulative emission reductions (2009–2025) anticipated from the recommended actions in the AFW sector. The greatest emission reductions achieved (67%) come from implementation of forest management and establishment for carbon sequestration. This policy incorporates programs to improve urban forestry, encourage afforestation/reforestation, and implement sustainable forestry management practices. Advanced recovery and recycling (AFW-8), also provides significant GHG benefits (22%) through source reduction, recycling, and composting. It is important to note that these emission reductions are life-cycle GHG reductions that occur both within and outside of Arkansas (resulting from lower energy use and GHG emissions to create, transport, and dispose of new products and packaging that are avoided through source reduction and recycling). Expanded use of agriculture and forestry biomass feedstocks for electricity, heat, or steam production (AFW-4) and expanded use of advanced biofuels (AFW-5) both offer significant GHG reductions. However, AFW-4 and AFW-5 overlap with recommendations under the ES and TLU Technical Work Groups, respectively. After accounting for overlap, these policies contribute a significantly smaller proportion to the AFW sector total.

Table 7-3. Summary List of Policy Recommendations

No.	Policy Recommendation		GHG Reductions ($MMtCO_2e$)			Net Present Value 2009–2025 (Million $)	Cost-Effectiveness ($/tCO_2e$)	Level of Support
			2015	2025	Total 2009–2025			
AFW-1*	Manure Management		*Not Quantified*					Unanimous
AFW-2†	Promotion of Farming Practices That Achieve GHG Benefits	Soil Carbon	0.5	1.3	11	–$71	–$6	Super Majority (1 objection)
		Nutrient Efficiency	0.1	0.3	2.4	–$66	–$27	
AFW-3†	Improved Water Management and Use	Increased Surface Water	0.005	0.01	0.10	$86	$835	Super Majority (1 objection)
		Improved Purification	0.001	0.001	0.01	–$0.4	–$39	
AFW-4†	Expanded Use of Agriculture and Forestry Biomass Feedstocks for Electricity, Heat, or Steam Production	Energy From Biomass	2.1	4.2	41	$1,637	$40	Super Majority (1 objection)
		Energy From Livestock Manure and Poultry Litter	0.01	0.02	0.2	$0.8	$4	
		Capture of Waste Heat	0.02	0.06	0.50	–$70	–$140	
AFW-5†	Expanded Use of Advanced Biofuels		1.4	2.2	20	$114	$6	Unanimous
AFW-6†	Expanded Use of Locally Produced Farm and Forest Products		0.03	0.06	0.6	$2	$4	Unanimous
AFW-7†	Forest Management and Establishment for Carbon Sequestration	Urban Forestry	0.02	0.1	0.4	$17	$41	Unanimous
		Sustainable Forest Management	4.1	10.4	91	$1,139	$21	
		Afforestation	0.7	1.8	16	$201	$12	
AFW-8†	Advanced Recovery and Recycling		1.5	4.4	36	–$283	–$8	Super Majority (1 objection)
AFW-9†	End-of-Use Waste Management Practices		0.02	0.02	0.4	–$1	–$3	Super Majority (1 objection)
	Sector Total After Adjusting for Overlaps‡		**7.8**	**18.3**	**162.2**	**$1,045**	**$6.4**	
	Reductions From Recent Actions		**0.0**	**0.0**	**0.0**	**$0.0**	**$0.0**	
	Sector Total Plus Recent Actions		**7.8**	**18.3**	**162.2**	**$1,045**	**$6.4**	

GHG = greenhouse gas; $MMtCO_2e$ = million metric tons carbon dioxide equivalent; $/tCO_2e$ = dollars per ton of carbon dioxide equivalent.

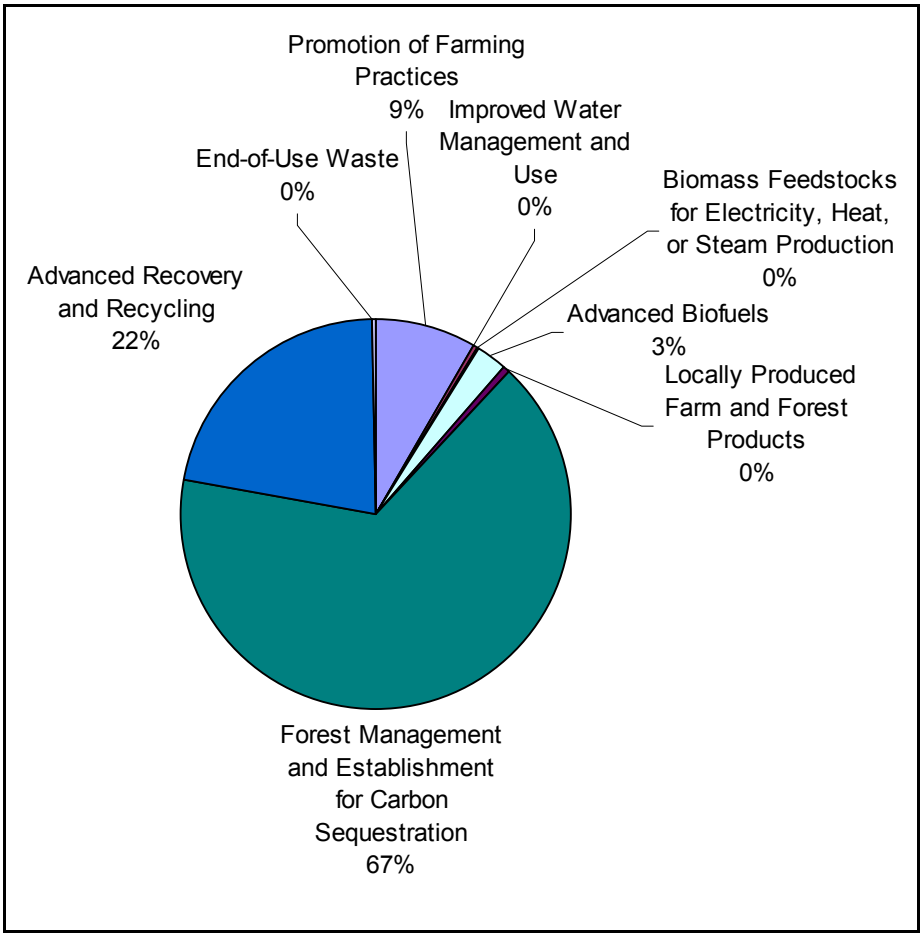
Negative values in the Net Present Value and the Cost-Effectiveness columns represent net cost savings associated with the recommendations. Totals in some columns may not add to the totals shown due to rounding.

* The GCGW approved this option at Meeting #8 (July 31, 2008); 19 members present and voting (two by phone).

† The GCGW approved this option at Meeting #9 (September 9, 2008); 18 members present and voting (one by phone).

*Overlaps include an assumed overlap of AFW-5 with TLU-3 (reductions excluded from AFW totals); an assumed 100% overlap of AFW-4 with ES-3 (reductions and costs excluded from AFW totals).

Figure 7-3. Percentage of avoided GHG emissions by policy



Agriculture, Forestry, and Waste Management Sectors Policy Descriptions

The AFW sectors include emission mitigation opportunities related to the use of biomass energy, protection and enhancement of forest and agricultural carbon sinks, control of agricultural CH_4 and N_2O emissions, production of renewable liquid fuels, production of additional biomass energy, forestation on nonforested lands, and an increase in municipal solid waste source reduction, recycling, composting, and landfill gas collection.

AFW-1 Manure Management

This policy recommendation promotes the use of improved manure management practices that reduce GHG emissions associated with manure handling and storage, including manure composting to reduce CH_4 emissions, movement of manure from nutrient-rich to nutrient-deficient areas, and improved methods for application to fields (for reduced N_2O emissions). Application improvements include incorporating manure into soil instead of surface spraying or spreading.

AFW-2 Promotion of Farming Practices That Achieve GHG Benefits

This policy recommendation addresses both agricultural soil carbon management and nutrient management to achieve GHG benefits. For soil carbon management, conservation-oriented management of agricultural lands, cropping systems, crop management, and agricultural practices may regulate the net flux of CO_2 from soil. Each farm operation and each field management unit has unique traits that may allow management practices to influence nutrient, water, and carbon cycling and sequestration.

The efficient use of agricultural fertilizer, both commercial and animal-based, can be improved through certain management practices and systems. An example is overapplication of nitrogen, which can result in plants not fully metabolizing the nitrogen, allowing the nitrogen to leach into groundwater and/or be emitted to the atmosphere as N_2O. Better nutrient utilization can lead to lower N_2O emissions from runoff. An example is tile drainage systems that use the latest technology and design models to reduce nitrates leaching into surface water and groundwater.

AFW-3 Improved Water Management and Use

The focus of this policy is on improving water management and use. Using surface water versus groundwater and decreasing water consumption both reduce pumping and energy consumption. Additionally, excess surface water can lead to runoff of nitrogen, with subsequent emission of N_2O to the atmosphere. Managing and improving water consumption and nutrients spread on crops will result in a minimal loss of carbon from the soil. Reusing water can create nutrient management problems, and must be considered when implementing this policy.

AFW-4 Expanded Use of Agriculture and Forestry Biomass Feedstocks for Electricity, Heat, or Steam Production

This policy dedicates a sustainable quantity of biomass from agricultural industry residues, agricultural lands, wood industry process residues, unused forestry residues, agroforestry resources, dedicated energy crops, MSW, and livestock manure and poultry litter to efficient conversion to heat, steam, or electricity. This biomass should be collected and used in an environmentally acceptable manner, considering proper facility siting and feedstock use (e.g., proximity of users to biomass, impacts on water supply and quality, control of air emissions, solid waste management, cropping management, nutrient management, soil and nonsoil carbon management, and impacts on biodiversity and wildlife habitat). The objective is to create concurrent reduction of GHG emissions due to displacement of fossil fuel, considering life-cycle emissions associated with viable collection, hauling, and energy conversion and distribution systems. An additional GHG benefit is obtained through reduced methane emissions resulting from the capture of emissions from manure and poultry litter. Additional benefits can be achieved through the capture and use of waste heat from biomass facilities, where the waste heat could be used for cogeneration to displace heating costs and fossil fuel use. Local electricity or steam production yields the greatest net energy payoff.

Note: This recommendation is linked with some Energy Supply and Residential, Commercial and Industrial renewable energy recommendations (i.e., ES-3a, ES-6, RCI-7, and RCI-8). AFW-4 focuses on the supply elements of the implementation of a biomass-to-energy program (e.g., availability, collection, and distribution), while the ES/RCI recommendations focus on the demand side (e.g., generation infrastructure and purchasing for consumers).

AFW-5 Expanded Use of Advanced Biofuels

This policy promotes sustainable in-state production of advanced biofuels from agriculture, forestry and MSW feedstocks (raw materials) to displace the use of conventional petroleum-based fuels. It also promotes advanced biofuel production systems that improve the embedded energy content and carbon profile of biofuels. It focuses on feedstocks that produce advanced biofuels with significantly lower embedded GHG emissions compared to conventional fuel products (from a life-cycle perspective).

This policy also promotes the in-state development of feedstocks, such as cellulosic material and perennials that are able to be utilized. Recognizing that conversion technologies, such as thermo-chemical Fischer-Tropsch processes and enzymatic conversion, are developing fast in this sector, the policy recommends facilitating, but not requiring, their development and establishment in Arkansas.

Note: This recommendation is linked with the Transportation and Land Use recommendation TLU-3 (Advanced Biofuels Development and Expansion). AFW-5 focuses on the supply elements of the implementation of a biofuels program, while TLU-3 focuses on the demand side (e.g., vehicle technology requirements, E10, E85).

AFW-6 Expanded Use of Locally Produced Farm and Forest Products

AFW-6 focuses on the production and consumption of locally produced agricultural and forest products to displace the consumption of goods transported from other states or countries, and thus reduce transportation-related GHG emissions. Additionally, increasing the amount of renewable wood products used for residential and commercial buildings can increase carbon sequestration in wood products and displace GHG emissions associated with processing high-energy input materials, such as steel, plastic, and concrete.

AFW-7 Forest Management and Establishment for Carbon Sequestration

Arkansas' forests and forest management have a significant role to play in the state's strategies to reduce or offset GHGs and adapt to future climate effects. This policy establishes or re-establishes forests on land not currently forested, such as fallow or marginal agricultural land ("afforestation"); promotes retaining forest cover and associated carbon stocks by regenerating forests ("reforestation" or "restoration"); helps maintain and improve the health and longevity of trees in urban and residential areas (urban forestry); and implements, in a carbon-sensitive manner, such practices as site preparation, erosion control, and stand stocking to ensure conditions that support forest growth.

Forest management activities promote forest productivity and increase the rate of CO_2 sequestration in forest biomass and soils and in harvested wood products. The urban forestry component also has the potential to reduce fossil fuel consumption through shading and wind protection of homes and commercial buildings. Reducing the severity of wildfires can reduce GHG emissions by lowering the forest carbon lost during a fire and maintaining carbon sequestration potential. Similarly, reducing damage from insects, disease, and invasive plants decreases GHG emissions by maintaining the carbon sequestration potential of healthy forests.

The implementation of this recommendation also needs to consider non-GHG benefits, such as the provision of wildlife habitat, biodiversity, and stream buffers and improvement of water quality.

AFW-8 Advanced Recovery and Recycling

Advanced recovery and recycling promotes the reduction of the volume of waste produced, as well as reduction in consumption through incentives, awareness, and increased efficiency. Three major areas of focus in Arkansas are source reduction, organic waste management, and advanced recycling. This policy builds on the statutory recycling goal of 45% by 2010 and provides GHG benefits not only from avoided disposal emissions, but also from product life-cycle emission reductions (associated with the manufacture and transport of new packaging and products). Redirecting organic wastes (such as food, yard, and paper) from landfills into composting programs is very effective at reducing GHG emissions. To be successful, this policy recommendation needs to promote reuse and recycling through best management practices for corporations, businesses, and government organizations.

AFW-9 End-of-Use Waste Management Practices

This policy promotes activities that further reduce GHG production by encouraging the use of energy recovery technologies. The focus is on the utilization of methane at landfills through the enabling of anaerobic digesters to capture and utilize that energy through electric power, heating, or liquefied natural gas. These technologies will help reduce GHG emissions from waste management, while producing cleaner energy. They make a two-fold contribution to climate protection, by reducing emissions of methane and other GHGs into the atmosphere (via collection and control), and offsetting energy that would have otherwise come from fossil fuels. For example, the emissions created by landfills (methane) can be used to make electricity that would have otherwise been produced from fossil-based feedstocks, such as natural gas or coal.