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Agriculture, Forestry, and Waste Management (AFW) Technical Work Group

Summary List of Pending Priority Policy Options for Analysis

	Policy Option	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 Yet Quantified*					Pending
AFW-2	Promotion of Farming Practices that Achieve GHG Benefits	*Not Yet Quantified*					Pending
AFW-3	Improved Water Management and Use	*Not Yet Quantified*					Pending
AFW-4	Expanded Use of Agriculture and Forestry Biomass Feedstocks for Electricity, Heat, or Steam Production	*Not Yet Quantified*					Pending
AFW-5	Expanded Use of In-State Liquid Biofuels	*Not Yet Quantified*					Pending
AFW-6	Expanded Use of Locally Produced Farm and Forest Products	*Not Yet Quantified*					Pending
AFW-7	Forest Management and Establishment for Carbon Sequestration	*Not Yet Quantified*					Pending
AFW-8	Advanced Recovery and Recycling	*Not Yet Quantified*					Pending
AFW-9	End of Use Waste Management Practices	*Not Yet Quantified*					Pending

Note: The numbering used to denote the above pending priority policy options is for reference purposes only; it does not reflect prioritization among these important draft policy options.

Table: Biomass Supply Assessment

Feedstock	Annual Biomass Supply (10^3 dry tons)	Heat Content (MMBtu/ton)	Approximate Energy Available (MMBtu)
Crop Residues	3,198	8.248	26,378,630
Forest Residues	5,265	9.961	52,448,370
Mill Residues	3,239	9.961	32,263,679
Urban Wood Residues	1,534	9.961	15,281,947
Municipal paper waste	293	13.03	3,813,568
Municipal Solid Waste	TBD	9.945	TBD
Yard waste	87	9.961	865,495
Used cooking oil	4	TBD	TBD
Biosolids	41	TBD	TBD

Sources:

Annual Biomass Supply: Arkansas Biomass Resource Assessment, Arkansas Economic Development Commission, http://arkansasedc.com/business_development/energy/?page=bioenergy

Biomass Heat Content: EIA Renewable Energy - Average Heat Content of Selected Biomass Fuels, http://www.eia.doe.gov/cneaf/solar.renewables/page/trends/table10.html

Moisture contents for paper waste (5%) and yard waste (40%) from: http://www.wyomingbusiness.org/pdf/energy/Biomass_MunicipalWaste.pdf

AFW-1. Manure Management

Policy Description

Potential manure management practices that reduce GHG emissions associated with manure handling and storage include (but are not limited to) manure composting (to reduce methane emissions), movement of manure from nutrient-rich to nutrient-deficient areas, and improved methods for application to fields (for reduced nitrous oxide [N_2O] emissions). Application improvements include incorporating manure into soil instead of surface spraying/spreading. Also, implementing digester and energy recovery projects at confined animal operations reduces methane emissions and uses the energy to displace fossil fuels. To date, most of these projects have been implemented at dairies and swine operations.

Policy Design

TBD

Goals:

By 2025, reduce methane emissions from animal feeding operations (AFOs) through methane capture (anaerobic digestion) projects covering X% of the State's dairies and hog operations.

By 2025, apply improved manure handling and storage practices on X% of manure generated.

Timing: TBD – [as approved by the TWG]

Parties Involved: TBD – [as approved by the TWG]

Other: TBD – [as needed and approved by the TWG]

Implementation Mechanisms

TBD – [as approved by the TWG]

Related Policies/Programs in Place

Poultry Litter

Act 1061 (HB 1654)—The act declares various areas of the state to be nutrient surplus areas for phosphorus and nitrogen, authorizes the Arkansas Soil and Water Conservation Commission to make rules concerning management of nutrients in nutrient surplus areas, and creates penalties for violations of the act.

Poultry Feeding—Management Plans

Act 2294 (SB 1160)—This act requires that, after January 1, 2007, poultry litter be applied to soils or associated crops within a nutrient surplus area in accordance with a nutrient-management plan or poultry-litter management plan.

Type(s) of GHG Reductions

- CH_4: *Capture and utilization or preventing the creation of methane.*
- N_2O: *reductions occur when nitrogen run-off and leaching are reduced, which leads to the formation and emission of N_2O.*

Estimated GHG Reductions and Costs or Cost Savings

TBD – [as approved by the TWG]

Data Sources: [TBD, as approved by the TWG]

Quantification Methods: [e.g., Full life cycle analysis with supply/demand equilibrium adjustments on TWG approval]

Key Assumptions: [TBD, as approved by the TWG]

Key Uncertainties

TBD – [as needed and approved by the TWG]

Additional Benefits and Costs

TBD – [as needed and approved by the TWG]

Feasibility Issues

TBD – [as needed and approved by the TWG]

Status of Group Approval

Pending – [until GCGW moves to final agreement at meeting #7 or #8]

Level of Group Support

TBD – [blank until GCGW meeting #7 or #8]

Barriers to Consensus

TBD – [blank until final vote by the GCGW]

AFW-2. Promotion of Farming Practices that Achieve GHG Benefits

Policy Description

The state could provide incentives to farmers for using production processes that achieve net GHG benefits. For example, some organic farming practices could reduce GHG emissions compared with conventional farming, depending on the specific practices implemented (e.g., use of no-till cultivation and fewer chemicals).

Policy Design

TBD

Goals:

By 2025, implement cultivation practices to enhance soil carbon levels on x% of the acreage that is not already using these practices.

By 2025, implement cultivation practices to reduce nutrient application by x%.

Timing: TBD – [as approved by the TWG]

Parties Involved: TBD – [as approved by the TWG]

Other: TBD – [as needed and approved by the TWG]

Implementation Mechanisms

TBD – [as approved by the TWG]

Related Policies/Programs in Place

TBD – [as needed and approved by the TWG]

Type(s) of GHG Reductions

- CO_2: *Improved efficiency can reduce electricity and fuel consumption and the associated GHGs.*

Estimated GHG Reductions and Costs or Cost Savings

TBD – [as approved by the TWG]

Data Sources: [TBD, as approved by the TWG]

Quantification Methods: [e.g., Full life cycle analysis with supply/demand equilibrium adjustments on TWG approval]

Key Assumptions: [TBD, as approved by the TWG]

Key Uncertainties

TBD – [as needed and approved by the TWG]

Additional Benefits and Costs

TBD – [as needed and approved by the TWG]

Feasibility Issues

TBD – [as needed and approved by the TWG]

Status of Group Approval

Pending – [until GCGW moves to final agreement at meeting #7 or #8]

Level of Group Support

TBD – [blank until GCGW meeting #7 or #8]

Barriers to Consensus

TBD – [blank until final vote by the GCGW]

AFW-3. Improved Water Management and Use

Policy Description

Water Management has two main components: Drainage and Irrigation. The use of surface versus ground water is an issue along with captured water. Benefits of surface water include reduced pumping energy consumption along with many ancillary benefits. Excess water can lead to runoff of nitrogen, with subsequent emission to the atmosphere as N_2O. Implementing best management practices improves the efficiency of water use. Managing and improving water consumption and nutrients spread on crops will result in a minimal loss of carbon from the soil. Reduced water consumption can also reduce energy use for water pumping. The reuse of water also becomes a nutrient management issue and must be considered when implemented. Water purification is an energy intensive process that is an issue for farmers and land users in addition to other sectors such as the residential, commercial and industrial sectors (this is related to options under RCI TWG). As such, water use in rural, suburban and urban areas must all be included. The impact of cat fish farms on GHG emissions could also be investigated.

Policy Design

TBD

Goals:

Decrease use of ground water for irrigation by X% by 2025.

Decrease energy use for water purification by X% in 2025.

Timing: TBD – [as approved by the TWG]

Parties Involved: TBD – [as approved by the TWG]

Other: TBD – [as needed and approved by the TWG]

Implementation Mechanisms

TBD – [as approved by the TWG]

Related Policies/Programs in Place

Through Act 341 of 1995 AR has invested significant funding and technical support (in addition to local and federal funding) towards using surface water as opposed to ground water. Three projects currently under way are:

a. Bayou Metro Water Management District
b. Boeuff Tensas Water Management District
c. White River Irrigation District

Each of the above projects is in various stages of development in their goals to utilize surface water instead of groundwater for irrigation purposes.

Type(s) of GHG Reductions

- CO_2: *Less energy used to pump water results in reduced CO_2 emissions.*
- N_2O: *reductions occur when nitrogen run-off and leaching are reduced, which leads to the formation and emission of N_2O.*

Estimated GHG Reductions and Costs or Cost Savings

TBD – [as approved by the TWG]

Data Sources: [TBD, as approved by the TWG]

Quantification Methods: [e.g., Full life cycle analysis with supply/demand equilibrium adjustments on TWG approval]

Key Assumptions: [TBD, as approved by the TWG]

Key Uncertainties

TBD – [as needed and approved by the TWG]

Additional Benefits and Costs

TBD – [as needed and approved by the TWG]

Feasibility Issues

TBD – [as needed and approved by the TWG]

Status of Group Approval

Pending – [until GCGW moves to final agreement at meeting #7 or #8]

Level of Group Support

TBD – [blank until GCGW meeting #7 or #8]

Barriers to Consensus

TBD – [blank until final vote by the GCGW]

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

Policy Description

Increasing the amount of biomass available from forests or agriculture for generating electricity can displace the use of fossil energy sources. This strategy also encourages the capture of waste heat at facilities using biomass (or fossil fuels), wherever possible. The waste heat could be used for cogeneration of electricity or other purposes that displace fossil fuel use. Arkansas could increase the amount of biomass available for generating electricity and displacing the use of fossil energy sources. Local electricity or steam production yields greatest net energy payoff.

Policy Design

Goals:

Agricultural Residues: Increase agricultural residues use for electricity, steam, and heat generation to utilize X% of available in-state agricultural residue biomass by 2015, X% of available biomass by 2025.

Forest Residues: Increase forest residues use for electricity, steam, and heat generation to utilize X% of available biomass by 2015, X% of available in-state forest residue by 2025.

Energy Crops: Increase the production of energy crops to produce biomass feedstock for electricity, steam, and heat generation by increasing acreage devoted to energy crops to X acres by 2025.

Methane from Livestock Manure and Poultry Litter: By 2025, utilize X% of available methane from livestock manure and Poultry Litter for renewable electricity, heat and steam generation. [Note overlap with AFW-1]

Capture of waste heat: By 2025, ensure that facilities using biomass are capturing X% of waste heat for use in electricity, heat and steam production.

Timing: TBD – [as approved by the TWG]

Parties Involved: TBD – [as approved by the TWG]

Other: TBD – [as needed and approved by the TWG]

Implementation Mechanisms

TBD – [as approved by the TWG]

Related Policies/Programs in Place

Electric Public Utility Renewable Energy Resources

Act 755 (HB 2812)—The act authorizes the Arkansas Public Service Commission to require a regulated electric public utility to consider renewable energy resources as part of its

resource plan. If the commission approves the renewable energy resource, it may allow the utility to implement a surcharge to recover a portion of the cost of that resource.

Type(s) of GHG Reductions

- CO_2, N_2O, CH_4: *Displaces emissions from fossil fuel combustion.*

Estimated GHG Reductions and Costs or Cost Savings

TBD – [as approved by the TWG]

Data Sources: [TBD, as approved by the TWG]

Quantification Methods: [e.g., Full life cycle analysis with supply/demand equilibrium adjustments on TWG approval]

Key Assumptions: [TBD, as approved by the TWG]

Key Uncertainties

TBD – [as needed and approved by the TWG]

Additional Benefits and Costs

TBD – [as needed and approved by the TWG]

Feasibility Issues

TBD – [as needed and approved by the TWG]

Status of Group Approval

Pending – [until GCGW moves to final agreement at meeting #7 or #8]

Level of Group Support

TBD – [blank until GCGW meeting #7 or #8]

Barriers to Consensus

TBD – [blank until final vote by the GCGW]

AFW-5. Expanded Production and Use of In-State Biofuels

Policy Description

Increased production of ethanol and/or biodiesel fuel from agriculture and/or forestry feedstocks and/or municipal solid and other waste (raw materials) could displace the use of fossil diesel. Arkansas could also promote the development of cellulosic ethanol technologies and ethanol production systems that use renewable fuels to improve the embedded energy content of ethanol. Increased in-state production and consumption gives the highest benefits. This strategy increases production of ethanol and/or biodiesel fuel from agriculture and/or forestry feedstocks (raw materials) to displace the use of fossil diesel. It promotes the development of cellulosic ethanol technologies and ethanol production systems that use renewable fuels to improve the embedded energy content of ethanol. Increased production and consumption in-state give the highest benefits.

Policy Design

TBD

Goals:

Gasoline displacement goals: Achieve in-state cellulosic ethanol production equivalent to offsetting gasoline consumption in the state by X% in 2015 and X% in 2025.

Fossil diesel displacement goals: Increase in-state biodiesel production from Arkansas feedstocks to offset diesel consumption in the state by X% in 2015 and X% in 2025.

OR Produce X,000 gallons of biodiesel and X,000 gallons of ethanol by 2025.

Timing: TBD – [as approved by the TWG]

Parties Involved: TBD – [as approved by the TWG]

Other: TBD – [as needed and approved by the TWG]

Implementation Mechanisms

TBD – [as approved by the TWG]

Related Policies/Programs in Place

Biodiesel Suppliers and Producers

Act 87 (26-52-401)—The act provides a tax credit for biodiesel suppliers in Arkansas, and incentives in the form of grants for biodiesel producers in the state.

Alternative Fuels Development Program

Act 873 —The act creates the Arkansas Alternative Fuels Development Program, to be administered by the Arkansas Agriculture Department with the purpose of providing grant

incentives for alternative-fuel producers and distributors and feedstock processors. The act also creates the Arkansas Alternative Fuels Development Fund and repeals obsolete sections of the Arkansas Code related to alternative fuels.

Alternative Fuels Development Program

Act 873 (HB 1379)—The act creates the Arkansas Alternative Fuels Development Program, to be administered by the Arkansas Agriculture Department, with the purpose of providing grant incentives for alternative fuels producers, feedstock processors, and alternative fuels distributors. The act also creates the Arkansas Alternative Fuels Development Fund and repeals obsolete sections of the Arkansas Code related to alternative fuels.

Type(s) of GHG Reductions

- CO_2: *Lifecycle emissions are reduced to the extent that biofuels are produced with lower embedded fossil-based carbon than conventional (fossil) fuel. Feedstocks used for producing biofuels can be made from crops or other biomass, which contain carbon sequestered during photosynthesis (e.g., biogenic or short-term carbon).*

Estimated GHG Reductions and Costs or Cost Savings

TBD – [as approved by the TWG]

Data Sources: [TBD, as approved by the TWG]

Quantification Methods: [e.g., Full life cycle analysis with supply/demand equilibrium adjustments on TWG approval]

Key Assumptions: [TBD, as approved by the TWG]

Key Uncertainties

TBD – [as needed and approved by the TWG]

Additional Benefits and Costs

TBD – [as needed and approved by the TWG]

Feasibility Issues

TBD – [as needed and approved by the TWG]

Status of Group Approval

Pending – [until GCGW moves to final agreement at meeting #7 or #8]

Level of Group Support

TBD – [blank until GCGW meeting #7 or #8]

Barriers to Consensus

TBD – [blank until final vote by the GCGW]

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

Policy Description

The production and consumption of locally produced agricultural goods displace the consumption of goods transported from other states or countries, and thus reduce transportation-related GHG emissions. Increasing the amount of renewable wood products used for residential and commercial building can increase carbon sequestration in wood products and displace GHG emissions associated with processing high-energy input materials, such as steel, plastic, and concrete. Also, using locally grown wood can lower transport-associated GHG emissions.

Policy Design

Put leverage on local governments to be part of the solution by ensuring that zoning does not preclude intelligent, sustainable uses that support this objective, such as constraining local value-add mills or limit location/participation in local markets.

Goals:

Farmer's Market: Increase the number of local farmer's markets in Arkansas by X% by 2015 and X% by 2025.

Local Produce: Of the food Arkansans consume, X% would be grown or produced locally by 2025.

Locally Grown and Processed Lumber: The amount of locally grown and processed lumber would displace imported wood by X% by 2015 and X% by 2025.

Timing: TBD – [as approved by the TWG]

Parties Involved: TBD – [as approved by the TWG]

Other: TBD – [as needed and approved by the TWG]

Implementation Mechanisms

TBD – [as approved by the TWG]

Related Policies/Programs in Place

Energy and Natural Resource Conservation Act: The act encourages the use of wood in green buildings and requires certain state buildings to meet specified environmental construction standards (AR Code 22-3-1801). The Leadership in Energy and Environmental Design (LEED) was reformed in Arkansas to explicitly encourage the use of wood products in green buildings (previously it was eligible but not encouraged). The addition by the Arkansas legislature specifically includes the use of products that promote the sequestration of carbon. This reform was initiated by Arkansas and a number of other states have since followed suit.

Type(s) of GHG Reductions

CO_2: *Extending carbon sequestration in durable wood products and wood construction. Maintaining carbon sequestration in healthy forests. Avoidance of emissions through reduced transportation miles. Avoidance of emissions through reduced use of high-energy input construction materials.*

Estimated GHG Reductions and Costs or Cost Savings

TBD – [as approved by the TWG]

Data Sources: [TBD, as approved by the TWG]

Quantification Methods: [e.g., Full life cycle analysis with supply/demand equilibrium adjustments on TWG approval]

Key Assumptions: [TBD, as approved by the TWG]

Key Uncertainties

TBD – [as needed and approved by the TWG]

Additional Benefits and Costs

TBD – [as needed and approved by the TWG]

Feasibility Issues

TBD – [as needed and approved by the TWG]

Status of Group Approval

Pending – [until GCGW moves to final agreement at meeting #7 or #8]

Level of Group Support

TBD – [blank until GCGW meeting #7 or #8]

Barriers to Consensus

TBD – [blank until final vote by the GCGW]

AFW-7. Forest Management and Establishment for Carbon Sequestration

Policy Description

This strategy establishes forests on land that has not historically been forested, such as agricultural land ("afforestation"); promotes forest cover and associated carbon stocks by regenerating or establishing forests ("reforestation" or "restoration"); helps maintain and improve the health and longevity of trees in urban and residential area (urban forestry); and implements 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. Additionally, specific trees could be selected that sequester other non-GHG chemicals in addition sequestering CO_2. Practices may include increased stocking of poorly stocked lands, age extension of managed stands, thinning and density management, fertilization and waste recycling, expanded short rotation of woody crops (for fiber and energy), expanded use of genetically preferred species, modified biomass removal practices, fire management and risk reduction, and pest and disease management.

Policy Design

Education and outreach especially for citizens and land managers will be an important part of this goal both to underscore importance of forests and to teach best management practices for forests.

Goals Related to Forest Management:

Implement sustainable forest management practices to achieve carbon benefits on X,000 acres of private land by 2025.

Implement sustainable forest management practices to achieve carbon benefits on X% of state-owned resource lands by 2025.

Restore/establish X,000 acres of forest by 2015 and X,000 acres by 2025.

Implement urban tree planting and retention programs to increase the number of urban trees by X by 2015 and by X by 2025.

Timing: TBD – [as approved by the TWG]

Parties Involved: TBD – [as approved by the TWG]

Other: TBD – [as needed and approved by the TWG]

Implementation Mechanisms

TBD – [as approved by the TWG]

Related Policies/Programs in Place

TBD – [as needed and approved by the TWG]

Type(s) of GHG Reductions

- CO_2: *Remove fuels that contribute to wildfire emissions. Maintain carbon sequestration through the production of durable wood products. Reduce emissions by reducing use of fossil fuels replaced by energy from woody biomass. Reduce emissions by preventing the release of carbon from dead and dying trees. Reduce wildfire emissions by maintaining healthy forests.*

Estimated GHG Reductions and Costs or Cost Savings

TBD – [as approved by the TWG]

Data Sources: [TBD, as approved by the TWG]

Quantification Methods: [e.g., Full life cycle analysis with supply/demand equilibrium adjustments on TWG approval]

Key Assumptions: [TBD, as approved by the TWG]

Key Uncertainties

TBD – [as needed and approved by the TWG]

Additional Benefits and Costs

TBD – [as needed and approved by the TWG]

Feasibility Issues

TBD – [as needed and approved by the TWG]

Status of Group Approval

Pending – [until GCGW moves to final agreement at meeting #7 or #8]

Level of Group Support

TBD – [blank until GCGW meeting #7 or #8]

Barriers to Consensus

TBD – [blank until final vote by the GCGW]

AFW-8. Advanced Recovery and Recycling

Policy Description

Increasing waste recovery and recycling and reducing waste generation limits GHG emissions associated with landfill methane generation and with the production of raw materials. Additional actions include increasing recycling programs, creating new recycling programs, providing incentives for recycling construction materials, developing markets for recycled materials, and increasing average participation/recovery rates for all existing recycling programs.

Policy Design

TBD

Goals:

Divert X% of the municipal solid waste stream to recycled materials markets by X% by 2015 and X% by 2025.

Timing: TBD – [as approved by the TWG]

Parties Involved: TBD – [as approved by the TWG]

Other: As mentioned in Appendix G of the Draft Arkansas Inventory and Forecast, the State of Arkansas has not yet published emplacement, diversion, or characterization data for municipal solid waste (MSW). However, *BioCycle* magazine published estimates for Arkansas' 2004 MSW management performance in its 15th survey of MSW management in the United States; "The State of Garbage."[1] *BioCycle* uses data from the *Waste Business Journal Directory & Atlas of Non-Hazardous Waste Sites* to develop estimates for states which do not report MSW management data. According to this publication, Arkansas generated about 2.8 million tons of MSW in 2004, of which 558,000 tons were recycled, 35,000 tons were incinerated (waste-to-energy combustion), and 2.2 million tons were landfilled. Of the total waste recycled, about 112,000 tons was compostable organic material that was composted. The total waste diversion rate in 2004 was 19.7%. The recycling rate was 15.8% and the composing rate is 3.9%. Absent additional information provided by the TWG or AR DEQ, these MSW disposal data will be considered the baseline for the analysis of this option.

NOTE: According to information received during the I&F process, it was discovered that there are currently no waste incinerator facilities in AR. This is a data question that should be resolved based on input from the TWG and AR DEQ.

[1] P. Simmons, N. Goldstein, S.M. Kaufman, N.J. Themelis, and J. Thompson, Jr. "The State of Garbage in Amercia." *BioCycle*. April 2006. Accessed on August 24, 2007, at http://www.seas.columbia.edu/earth/wtert/sofos/Simmons_SOG06.pdf

Implementation Mechanisms

TBD – [as approved by the TWG]

Related Policies/Programs in Place

Recycling Goals

Act 94 (HB 1055)—The act adds a new goal to the year 2000 recycling goals for Arkansas, which is to recycle 40% of the municipal solid waste by the end of 2005 and 45% of the municipal solid waste by the end of 2010. The term "municipal solid waste" is defined.

Solid Waste Management and Recycling Fund

Act 1325 (SB 575)—This act provides that grants from the Solid Waste Management and Recycling Fund may be used for the cost of "recycling programs." Previous law permitted grants to be used for "recycling programs and market development."

Type(s) of GHG Reductions

- CO_2: *Upstream Energy Use Reductions – The energy and GHG intensity of manufacturing a product is generally less using recycled feedstocks than from using virgin feedstocks.*
- CH_4: *Diverting biodegradable wastes from landfills will result in a decrease in methane gas releases from landfills.*

Estimated GHG Reductions and Costs or Cost Savings

TBD – [as approved by the TWG]

Data Sources: [TBD, as approved by the TWG]

Quantification Methods: [e.g., Full life cycle analysis with supply/demand equilibrium adjustments on TWG approval]

Key Assumptions: [TBD, as approved by the TWG]

Key Uncertainties

TBD – [as needed and approved by the TWG]

Additional Benefits and Costs

TBD – [as needed and approved by the TWG]

Feasibility Issues

TBD – [as needed and approved by the TWG]

Status of Group Approval

Pending – [until GCGW moves to final agreement at meeting #7 or #8]

Level of Group Support

TBD – [blank until GCGW meeting #7 or #8]

Barriers to Consensus

TBD – [blank until final vote by the GCGW]

AFW-9. End of Use Waste Management Practices

Policy Description

These programs use the renewable energy created at landfills by anaerobic digesters (methane) to make electric power, space heat, or liquefied natural gas. New processes for converting waste energy include biomass gasification and pyrolysis. A range of renewable products can be developed from these processes, including gaseous and liquid fuels, biochar, and chemical products. Existing processes include waste combustion and energy recovery (as electricity, steam, or both).

Policy Design

TBD

Goals: Increase the number of uncontrolled municipal solid waste landfills recovering methane as an energy source, such that X% of the landfill gas being generated at uncontrolled landfill sites is controlled by 2025. This can be done through development of additional landfill gas to energy (LFGTE) and anaerobic digester projects.

Timing: TBD – [as approved by the TWG]

Parties Involved: TBD – [as approved by the TWG]

Other:

CCS has yet to identify any projects undertaking the anaerobic digestion of solid waste for the purposes of energy capture. There are, however three current projects that capture the methane from landfills and convert it to either electricity or direct heat. EPA's Lanfill Methane Outreach Program (LMOP) has identified six other landfills in Arkansas as having being "candidate" or "potential" landfills for landfill methane-to-energy conversion.[2] Based on the baseline data from the Draft Inventory and Forecast, the 2005 GHG emissions from municipal landfills was about 1.7 $MMtCO_2e$. Based on the current annual GHG reductions from landfill gas to energy (LFGTE) projects already in place (0.37 $MMtCO_2e$), the baseline percentage (2005) methane captured from landfills in Arkansas was about 18%.

Implementation Mechanisms

TBD – [as approved by the TWG]

Related Policies/Programs in Place

TBD – [as needed and approved by the TWG]

[2] US EPA. Landfill Gas Energy Projects and Candidate Landfills. Online Database accessed on January 28, 2008 at: http://www.epa.gov/lmop/proj/index.htm.

Type(s) of GHG Reductions

- CO_2: *Upstream Energy Use Reductions – The energy and GHG intensity of manufacturing a product is generally less using recycled feedstocks than from using virgin feedstocks.*
- CH_4: *Diverting biodegradable wastes from landfills will result in a decrease in methane gas releases from landfills.*

Estimated GHG Reductions and Costs or Cost Savings

TBD – [as approved by the TWG]

Data Sources: [TBD, as approved by the TWG]

Quantification Methods: [e.g., Full life cycle analysis with supply/demand equilibrium adjustments on TWG approval]

Key Assumptions: [TBD, as approved by the TWG]

Key Uncertainties

TBD – [as needed and approved by the TWG]

Additional Benefits and Costs

TBD – [as needed and approved by the TWG]

Feasibility Issues

TBD – [as needed and approved by the TWG]

Status of Group Approval

Pending – [until GCGW moves to final agreement at meeting #7 or #8]

Level of Group Support

TBD – [blank until GCGW meeting #7 or #8]

Barriers to Consensus