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**Agriculture, Forestry, and Waste Management Technical Work Group
Summary List of Draft Priority Policy Options for Analysis**

Draft Option #	Draft Policy Option Name	Straw Proposal Volunteers
AFW-1	Agricultural Crop Management	Andy Hart, Staci Bohlen
AFW-2	Land Use Management Approaches for Protection and Enrichment of Soil Carbon (<i>TLU-1</i>)	Staci Bohlen
AFW-3	In-State Liquid Biofuels Production (<i>TLU-3</i>)	Andy Hart
AFW-4	Expanded Use of Biomass Feedstocks for Electricity, Heat, or Steam Production (<i>ES-2</i>)	
AFW-5	Forestry Management Programs to Enhance GHG Benefits	
AFW-6	Forest Protection – Reduced Clearing and Conversion to Nonforest Cover	
AFW-7	Integrated Waste Management	Julie Ketchum
AFW-8	End of Use Waste Management Practices	Julie Ketchum

Sample Draft Policy Option Template

AFW-1 Agricultural Crop Management

Policy Description

Crop management and agricultural practices contribute to both the production of greenhouse gases (GHG) and the sequestration of carbon dioxide (CO₂). Provide incentives to farmers for using production processes that achieve net GHG benefits. For example, some organic farming systems reduce GHG emissions compared to conventional farming such as use of no-till cultivation and fewer chemical inputs. Shifting to perennial herbaceous ground covers versus annuals can likewise improve CO₂ retention.

The efficiency of fertilizer use and other nitrogen-based soil amendments can be improved through certain management practices and systems. Avoiding excess nitrogen not metabolized by plants is important as free nitrogen can leach into groundwater and/or be emitted to the atmosphere as N₂O. Better nutrient utilization can lead to lower nitrous oxide emissions from run-off.

Policy Design

Goals: CCS drafts based on inputs from volunteers for straw proposals and then moves proposed text to the full TWG for review/revision, then on to the MCCAG at the next meeting: e.g. see AFW-3.

- **Timing:** see AFW-3.
- **Parties Involved:** see AFW-3.
- **Other:** see AFW-3.

Implementation Mechanisms

TBD

TWG comments: Flexible outcome-based measures will give farmers the ability to use various management methods and practices.

Recommend a strong research and development component.

Suggestion from TWG: Management outcomes could be used with indices rather than practice-based approaches (i.e. energy consumption indices and nutrient indices related to carbon).

Related Policies/Programs in Place

Blue Earth River Basin Initiative ran a project called the Third Crop Initiative. This initiative aims to replace annual crops with perennial crops.

Types(s) of GHG Reductions

- N₂O: reductions occur when nitrogen run-off and leaching are reduced, which leads to the formation and emission of N₂O.
- CO₂: reductions occur as soil carbon levels in crop soils are increased above business as usual levels. Increasing the levels of carbon in soils indirectly sequesters carbon from the atmosphere.

Estimated GHG Reductions and Net Costs or Cost Savings

TBD – [CCS should provide a worksheet and other reference material as needed for transparency]

- **Data Sources:** [TBD by CCS on TWG approval]
- **Quantification Methods:** [e.g. Full life-cycle analysis with supply/demand equilibrium adjustments on TWG approval]
- **Key Assumptions:** [TBD, as needed on TWG approval]

Key Uncertainties

TBD – [as needed and approved by the TWGs]

Additional Benefits and Costs

TBD – [as needed and approved by the TWGs]

TWG Suggestion: IPCC prioritizes N₂O management as high, with important water quality benefits.

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until MCCAG moves to final agreement at meeting #5 or #6]

Level of Group Support

TBD – [blank until MCCAG meeting #5]

Barriers to Consensus

TBD – [blank until final vote by the MCCAG]

Sample Draft Policy Option Template

AFW-2 Land Use Management Approaches for Protection and Enrichment of Soil Carbon

Policy Description

Convert marginal agricultural land used for annual crops to permanent cover such as grassland/rangeland, orchard, or forest, where the soil carbon and/or carbon in biomass is higher under the new land use. Includes opportunities to keep CRP lands covered in perpetuity. Adopt mechanisms to prevent these acres from either returning to conventionally tilled production or to suburban/urban development. Conserve lands that hold high levels of soil organic carbon, such as peatlands and wetlands.

Policy Design

Goals: [CCS drafts based on inputs from volunteers for straw proposals and then moves proposed text to the full TWG for review/revision, then on to the MCCAG at the next meeting: e.g. see AFW-3.

- **Timing:** see AFW-3.
- **Parties Involved:** see AFW-3.
- **Other:** see AFW-3.

Implementation Mechanisms

TBD – [CCS drafts based on TWG inputs; this can be developed as they go along, and can start early or late as they prefer; the level of detail can vary on TWG approval]

Related Policies/Programs in Place

Minnesota has invested significantly in preservation and restoration of significant conservation lands -including forests, prairies, and wetlands. The Minnesota DNR owns and manages over 1.1 million acres of public conservation lands in addition to the state forestland. In addition, the State of Minnesota holds long term conservation easements on nearly 200,000 acres of privately owned lands. Restoration and management strategies for these lands focus on restoring diverse native plant communities, which are shown to be very productive in the sequestration of carbon.

In 1991, Minnesota established one of the most sweeping wetlands protection laws in the country: the Wetland Conservation act. With a goal of no-net-loss of wetlands, the Wetland Conservation Act requires anyone proposing to drain, fill, or excavate a wetland first try to avoid disturbing the wetland; second, to try to minimize any impact on the wetland; and, finally, to replace any lost wetland acres, functions, and values.

Types(s) of GHG Reductions

- **CO₂:** Conservation of agricultural lands retains the ability of the land to sequester carbon in soil and biomass. Also, emissions are indirectly reduced to the extent that development patterns are influenced and vehicle miles traveled (VMT) are reduced (see TLU Option 1).

Estimated GHG Reductions and Net Costs or Cost Savings

TBD – [CCS should provide a worksheet and other reference material as needed for transparency]

- **Data Sources:** [TBD by CCS on TWG approval]
- **Quantification Methods:** [e.g. Full life-cycle analysis with supply/demand equilibrium adjustments on TWG approval]
- **Key Assumptions:** [TBD, as needed on TWG approval]

Key Uncertainties

TBD – [as needed and approved by the TWGs]

Additional Benefits and Costs

TBD – [as needed and approved by the TWGs]

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until MCCAG moves to final agreement at meeting #5 or #6]

Level of Group Support

TBD – [blank until MCCAG meeting #5]

Barriers to Consensus

TBD – [blank until final vote by the MCCAG]

Sample Draft Policy Option Template

AFW-3 In-State Liquid Biofuels Production

Policy Description

Increase production of ethanol and/or biodiesel fuel from agriculture and/or forestry feedstocks (raw materials) to displace the use of fossil diesel. Assess the viability of other advanced biofuels. Promote the development of cellulosic ethanol technologies and ethanol production systems that use renewable fuels to improve the embedded energy content of ethanol. Focus on biofuel feedstocks from perennial plant material, maintaining sequestration potential and soil productivity. Increased production and consumption in state give the highest benefits.

Note: This option is linked with TLU Option 3 on Biofuels. This option seeks to achieve incremental GHG benefits beyond the TLU option by promoting in-state production of biofuels using feedstocks with greater GHG benefits than the likely business as usual national production methods. In addition, MN consumption of biofuels produced in-state will produce better GHG benefits than these same fuels obtained from a national market due to lower embedded CO₂ associated with transportation of biodiesel and ethanol or its feedstocks from distant sources.

Policy Design

Goals: [CCS drafts based on inputs from volunteers for straw proposals and then moves proposed text to the full TWG for review/revision, then on to the MCCAG at the next meeting: e.g. “Several projects are being proposed in Minnesota that would result in the production of x million gallons of ethanol annually in Minnesota by 200x. Production incentives could increase this amount by x% beyond expected levels in 20xx, and x% by 20xx.

- **Timing:** Startup in 20xx and ramp up to higher levels in 20xx and 20xx, consistent with goals.
- **Parties Involved:** Suppliers of feedstocks, ethanol producers, and distributors. Associated agencies would include: xxx...
- **Other:** As needed, identify incentives that encourage the growing and supply of feedstocks and the utilization of ethanol in transportation markets across the state.”]

Implementation Mechanisms

TBD – [CCS drafts based on TWG inputs; this can be developed as they go along, and can start early or late as they prefer; the level of detail can vary on TWG approval]

TWG Suggestion: A low-carbon index or biofuels production should be incorporated, along with feedstock sustainability standards.

Related Policies/Programs in Place

Ethanol: Minnesota established an ethanol production incentive to provide payment to producers to help develop a new market for Minnesota's agricultural products. On the market side, Minnesota requires that all gasoline sold in the state be blended with a 10% ethanol mix. In addition, Minnesota began efforts in 1997 to develop a network of fueling stations for flex fuel vehicles that could run on an 85% ethanol blend.

Biodiesel: According to the U.S. Department of Energy, biodiesel has the most favorable energy balance of any transportation fuel. For every unit of energy needed to produce a gallon of biodiesel, 3.2 units of energy are gained. As of September 29, 2005, Minnesota requires nearly all diesel fuel sold in the state to contain at least a 2 percent biodiesel blend.

Types(s) of GHG Reductions

- **CO₂:** 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 Net Costs or Cost Savings

TBD – [CCS should provide a worksheet and other reference material as needed for transparency]

- **Data Sources:** [TBD by CCS on TWG approval]
- **Quantification Methods:** [e.g. Full life-cycle analysis with supply/demand equilibrium adjustments on TWG approval]
- **Key Assumptions:** [TBD, as needed on TWG approval]

Key Uncertainties

TBD – [as needed and approved by the TWGs]

Additional Benefits and Costs

TBD – [as needed and approved by the TWGs]

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until MCCAG moves to final agreement at meeting #5 or #6]

Level of Group Support

TBD – [blank until MCCAG meeting #5]

Barriers to Consensus

TBD – [blank until final vote by the MCCAG]

Sample Draft Policy Option Template

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

Policy Description

Increase the amount of biomass from agriculture, land restoration activities and forests available for generating electricity and displacing the use of fossil energy sources. Local electricity or steam production yields greatest net energy payoff.

Improve the rate of technology development and market deployment of biomass gasification and combined cycle (BGCC) technologies. These technologies expand the application of renewable fuels derived from biomass.

Policy Design

Goals: [CCS drafts based on inputs from volunteers for straw proposals and then moves proposed text to the full TWG for review/revision, then on to the MCCAG at the next meeting: e.g. see AFW-3.

- **Timing:** see AFW-3.
- **Parties Involved:** see AFW-3.
- **Other:** see AFW-3.

Implementation Mechanisms

TBD – [CCS drafts based on TWG inputs; this can be developed as they go along, and can start early or late as they prefer; the level of detail can vary on TWG approval]

TWG Suggestion: Focus on high potential, low cost actions that do not adversely effect existing agriculture and forestry practices.

Related Policies/Programs in Place

The Laurentian Energy Authority Biomass Energy Project has provided \$150,000 to the Minnesota Forest Resources Council (MFRC) to establish guidelines for sustainable removal of woody biomass from forests for energy, and to the MN DNR to develop similar guidelines for brushlands and open lands. This project has produced a partnership between public utilities in the Cities of Virginia and Hibbing. Public utilities in these cities have converted formerly coal-fired power plants to power plants that re now 75% fueled by woody biomass.

The Minnesota legislature overwhelmingly passed a bill on February 2007 requiring the state's utilities to generate at least 25 percent of their electricity from renewables by 2025. Under the new law, Minnesota will add between 5,000 to 6,000 MW of new renewable energy.

Types(s) of GHG Reductions

CO₂, N₂O, CH₄: Displaces emissions from fossil fuel combustion.

Estimated GHG Reductions and Net Costs or Cost Savings

TBD – [CCS should provide a worksheet and other reference material as needed for transparency]

- **Data Sources:** [TBD by CCS on TWG approval]
- **Quantification Methods:** [e.g. Full life-cycle analysis with supply/demand equilibrium adjustments on TWG approval]
- **Key Assumptions:** [TBD, as needed on TWG approval]

Key Uncertainties

TBD – [as needed and approved by the TWGs]

Additional Benefits and Costs

TBD – [as needed and approved by the TWGs]

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until MCCAG moves to final agreement at meeting #5 or #6]

Level of Group Support

TBD – [blank until MCCAG meeting #5]

Barriers to Consensus

TBD – [blank until final vote by the MCCAG]

Sample Draft Policy Option Template

AFW-5 Forestry Management Programs to Enhance GHG Benefits

Policy Description

Public or private, urban, managed or wild, forests provide many opportunities to gain greenhouse gas (GHG) benefits. The following are actions that are recommended:

Maintain and improve the health and longevity of trees in urban and residential areas to protect and enhance the carbon stored in tree biomass. Indirect emissions reductions may also occur by reducing heating and cooling needs as a result of planting shade trees.

Promote forest cover and associated carbon stocks by regenerating or establishing forests in areas with little or no present forest cover (reforestation). When done emulating natural diversity rather than tree farming, additional benefits include public recreation, water quality, wildlife habitat and enhanced biodiversity. Where socially and biologically appropriate, establish forests on land that has not historically been forested, such as agricultural land (afforestation). Also, implement practices such as soil preparation, erosion control, and stand stocking to ensure conditions that support forest growth.

Encourage forest management activities that promote forest productivity and increase the rate of carbon dioxide sequestration in forest biomass and soils, and in harvested wood products. Practices may include: increased stocking of poorly stocked lands, age extension of managed stands, thinning and density management, fertilization and waste recycling, expand short rotation woody crops (for fiber and energy), expanded use of genetically preferred species, modified biomass removal practices, fire management and risk reduction, pest and disease management.

Programs that reduce the potential for and severity of wildfires also reduce GHG emissions by lowering the forest carbon lost during the fire in addition to the subsequent losses of carbon sequestration potential in the area impacted by wildfire. Programs that reduce insect damage to forests also reduce GHG emissions by maintaining the carbon sequestration achieved in healthy forests.

Policy Design

Goals: [CCS drafts based on inputs from volunteers for straw proposals and then moves proposed text to the full TWG for review/revision, then on to the MCCAG at the next meeting: e.g. see AFW-3.

- **Timing:** see AFW-3.
- **Parties Involved:** see AFW-3.

- **Other:** see AFW-3.

Implementation Mechanisms

TBD – [CCS drafts based on TWG inputs; this can be developed as they go along, and can start early or late as they prefer; the level of detail can vary on TWG approval]

TWG Note: Many funding sources can help implement these multi-faceted options.

Related Policies/Programs in Place

The Board of Soil and Water Resources (BSWR) has been directed by the 2007 MN legislature to administer \$500k in grants to conduct site level ecological research and assessments, a clean energy program, and technical teams for native seed harvesting and working lands initiatives.

Comment from MCCAG member - The State has spent many millions of dollars since 1990 on a nationally recognized program called Minnesota ReLeaf, a cost-share program designed to plant trees in urban and rural areas to sequester carbon, promote energy conservation, and provide an array of other co-benefits. The MN DNR Division of Forestry may have cost per ton figures available, which may not be M-H. Contacts: Division of Forestry Assistant Director Bob Tomlinson (651/259-5290) and Urban and Community Forestry Coordinator Ken Holman (651/259-5269)

Types(s) of GHG Reductions

CO₂: Promotion of forestry management programs serves to increase the sequestration of carbon in forested lands, as well as preventing carbon currently stored in Minnesota's forests from being released.

Estimated GHG Reductions and Net Costs or Cost Savings

TBD – [CCS should provide a worksheet and other reference material as needed for transparency]

- **Data Sources:** [TBD by CCS on TWG approval]
- **Quantification Methods:** [e.g. Full life-cycle analysis with supply/demand equilibrium adjustments on TWG approval]
- **Key Assumptions:** [TBD, as needed on TWG approval]

Key Uncertainties

TBD – [as needed and approved by the TWGs]

TWG Note: Tree mortality has doubled since 1977, from 123 to 250 million cubic feet. Mortality rate could continue to increase, increasing susceptibility to wildfires and large releases of CO₂

Additional Benefits and Costs

TBD – [as needed and approved by the TWGs]

TWG Suggestion: Management for carbon sequestration will also benefit production of high quality wood products for the construction industry keeping the carbon out of the cycle for a greatly increased time period.

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until MCCAG moves to final agreement at meeting #5 or #6]

Level of Group Support

TBD – [blank until MCCAG meeting #5]

Barriers to Consensus

TBD – [blank until final vote by the MCCAG]

Sample Draft Policy Option Template

AFW-6 Forest Protection – Reduced Clearing and Conversion to Nonforest Cover

Policy Description

Reduce losses of forested lands and their carbon sequestration potential to development or other non-productive land uses. Forestland captures and stores carbon dioxide in trees, soil and other forest biomass. Developed areas contain lower amounts of biomass and its associated carbon. These developed areas also sequester less carbon dioxide than forested areas.

Policy Design

Goals: [CCS drafts based on inputs from volunteers for straw proposals and then moves proposed text to the full TWG for review/revision, then on to the MCCAG at the next meeting: e.g. see AFW-3.

- **Timing:** see AFW-3.
- **Parties Involved:** see AFW-3.
- **Other:** see AFW-3.

Implementation Mechanisms

TBD – [CCS drafts based on TWG inputs; this can be developed as they go along, and can start early or late as they prefer; the level of detail can vary on TWG approval]

Related Policies/Programs in Place

The Minnesota Forest Legacy Partnership is a group of public and private business and non-profit interests engaged in promoting large-scale forest conservation easements in northern and central Minnesota. A 51,000 acre forest easement in Koochiching and Itasca County is being actively pursued, and two additional easements comprising a total of 76,000 acres have been proposed in Koochiching County (located on the Ontario border in north central MN). Most of the funding for purchasing the 51,000 easement has been obtained from private foundation, other private, and state sources, and funding for the additional easements is being sought.

Types(s) of GHG Reductions

CO₂: Avoided emissions from forest clearing and maintenance of annual carbon sequestration from forest growth.

Estimated GHG Reductions and Net Costs or Cost Savings

TBD – [CCS should provide a worksheet and other reference material as needed for transparency]

- **Data Sources:** [TBD by CCS on TWG approval]
- **Quantification Methods:** [e.g. Full life-cycle analysis with supply/demand equilibrium adjustments on TWG approval]
- **Key Assumptions:** [TBD, as needed on TWG approval]

Key Uncertainties

TBD – [as needed and approved by the TWGs]

Additional Benefits and Costs

TBD – [as needed and approved by the TWGs]

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until MCCAG moves to final agreement at meeting #5 or #6]

Level of Group Support

TBD – [blank until MCCAG meeting #5]

Barriers to Consensus

TBD – [blank until final vote by the MCCAG]

Sample Draft Policy Option Template

AFW-7 Integrated Waste Management

Policy Description

Integrated waste management permits the reduction of the sheer volume of waste as well as encourages reduction in consumption through incentives, awareness and increased efficiency. Three major areas of focus in Minnesota are advanced recycling, organic waste management and source reduction.

Increase reuse, recycling, and reduce waste generation in order to limit greenhouse gas emissions associated with landfill methane generation and with the production of raw materials. Expand existing recycling programs, create new recycling programs, provide incentives for the recycling of construction materials, develop markets for recycled materials, and increase average participation/recovery rates for all existing recycling programs.

Reduce the volume of waste from residential, commercial, and government sectors through programs that reduce overall disposal. Reduction of waste generation at the source - of production (including packaging) and of consumption - reduces both landfill emissions as well as upstream production emissions.

Reduce methane emissions associated with landfilling by reducing the biodegradable fraction of waste emplaced. Recently, an area of focus in the solid waste industry has been in increase recycling of organic wastes (lawn & garden waste, food waste, wood, paper, etc.) using different conversion technologies, including composting, anaerobic digestion, or hybrids of these technologies.

Policy Design

Goals: [CCS drafts based on inputs from volunteers for straw proposals and then moves proposed text to the full TWG for review/revision, then on to the MCCAG at the next meeting: e.g. see AFW-3.

- **Timing:** see AFW-3.
- **Parties Involved:** see AFW-3.
- **Other:** see AFW-3.

Implementation Mechanisms

TBD – [CCS drafts based on TWG inputs; this can be developed as they go along, and can start early or late as they prefer; the level of detail can vary on TWG approval]

Related Policies/Programs in Place

The Minnesota Pollution Control Agency is undertaking a campaign to “reinvigorate recycling.” The state has one of the nation’s highest recycling rates, but the MPCA intends to increase that rate. Even a slight increase in the rate has a significant impact on reducing GHG emissions.

Minnesota PCA promotes increased composting of yard waste and source separated organics. By applying it to soils, the compost sequesters carbon by utilizing the short term carbon cycle. In 2005, about 19,000 tons of compost was created and used as soil amendment. That is only capturing about 1% of the organic materials in the solid waste stream. A more aggressive effort could capture 10 % of the organics in the solid waste stream. This does not include any industrial waste such as vegetable processing wastes, bio-solids, manure composting or digestion. There is a large potential here that is as yet untapped. MPCA is working to increase the amount of composted material.

Types(s) of GHG Reductions

- **CO₂:** Upstream Energy Use Reductions – The energy and GHG intensity of manufacturing a product is generally less using recycled feedstocks than from using virgin feedstocks.
- **CH₄:** Diverting biodegradable wastes from landfills will result in a decrease in methane gas releases from landfills.

Estimated GHG Reductions and Net Costs or Cost Savings

TBD – [CCS should provide a worksheet and other reference material as needed for transparency]

- **Data Sources:** [TBD by CCS on TWG approval]
- **Quantification Methods:** [e.g. Full life-cycle analysis with supply/demand equilibrium adjustments on TWG approval]
- **Key Assumptions:** [TBD, as needed on TWG approval]

Key Uncertainties

TBD – [as needed and approved by the TWGs]

Additional Benefits and Costs

TBD – [as needed and approved by the TWGs]

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until MCCAG moves to final agreement at meeting #5 or #6]

Level of Group Support

TBD – [blank until MCCAG meeting #5]

Barriers to Consensus

TBD – [blank until final vote by the MCCAG]

Sample Draft Policy Option Template

AFW-8 End of Use Waste Management Practices

Policy Description

Encourage and promote the use of anaerobic digesters and other energy recovery technologies for waste materials rather than traditional landfilling. These projects will help prevent the emission of methane from landfills while producing clean energy. Anaerobic digesters make a two-fold contribution to climate protection: the usual unchecked discharge of methane into the atmosphere is prevented, and the burning of fossil fuels is replaced with renewable energy (biogas). The renewable energy created at landfills by anaerobic digesters (methane) can be used to make electric power, space heat, or liquefied natural gas.

A bioreactor in landfills is essentially in-landfill composting activity at a Subtitle D sanitary landfill in which liquid, temperature, and air (for aerobic processes), are managed in a controlled manner to achieve rapid stabilization of the food, greenwaste, and paper-waste constituents. To optimize the rapid waste stabilization of these wastes, moisture, gas composition, gas flow, and temperature must be carefully maintained and monitored. Bioreactor technology is used to accelerate waste stabilization, enhance gas production and collection, control leaching, reduce volume, and minimize long-term liability of waste.

New processes 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

Goals: [CCS drafts based on inputs from volunteers for straw proposals and then moves proposed text to the full TWG for review/revision, then on to the MCCAG at the next meeting: e.g. see AFW-3.

- **Timing:** see AFW-3.
- **Parties Involved:** see AFW-3.
- **Other:** see AFW-3.

Implementation Mechanisms

TBD – [CCS drafts based on TWG inputs; this can be developed as they go along, and can start early or late as they prefer; the level of detail can vary on TWG approval]

Related Policies/Programs in Place

Currently, nine waste-to-energy facilities in Minnesota process 3,800 tons of MSW per day for industrial heat and electrical generation. The total energy reclaimed since 1982, when these facilities first began to come on-line, is the equivalent of 12 million tons of coal. Currently, these facilities produce approximately 100,000 megawatts of electrical energy, or enough energy to power 110,000 homes. The MPCA has a strategic objective to increase the state's waste-to-energy capacity by 60% by 2011. In 2005, Minnesota waste-to-energy reduced carbon dioxide and methane gases by an amount equivalent to taking 90,000 cars off the road.

There are twenty-one open mixed municipal landfills in Minnesota. The majority of these facilities are owned and operated by county governments. Two of these facilities (Waste Management's Elk River Facility, and BFI's Pine Bend Facility) currently generate electricity derived from the collection and combustion of the methane gas generated as a result of waste decomposition. Methane is a potent greenhouse gas. A third facility, Three Rivers Landfill in Kanabec County, will be capturing methane for the production of energy in the near future. Lyon County is currently assessing the potential of a landfill gas-to-energy project at their county owned facility. The MPCA has been proactive with landfill owners and operators in promoting and encouraging the capture and utilization of this valuable resource.

Types(s) of GHG Reductions

- **CH₄:** Methane reductions via collection and control (via flaring, or preferentially via energy utilization).
- **CO₂:** Reduction of fossil fuels and associated GHGs through the generation of electricity from landfill methane.

Estimated GHG Reductions and Net Costs or Cost Savings

TBD – [CCS should provide a worksheet and other reference material as needed for transparency]

- **Data Sources:** [TBD by CCS on TWG approval]
- **Quantification Methods:** [e.g. Full life-cycle analysis with supply/demand equilibrium adjustments on TWG approval]
- **Key Assumptions:** [TBD, as needed on TWG approval]

Key Uncertainties

TBD – [as needed and approved by the TWGs]

Additional Benefits and Costs

TBD – [as needed and approved by the TWGs]

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until MCCAG moves to final agreement at meeting #5 or #6]

Level of Group Support

TBD – [blank until MCCAG meeting #5]

Barriers to Consensus

TBD – [blank until final vote by the MCCAG]