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Brief Description of Catalog Items Agriculture, Forestry, and Waste Management Subcommittee

(Note: This listing is incomplete and will be fleshed out during the subcommittee process. Subcommittee members are encouraged to provide input to the subcommittee facilitators on existing policies and programs, where relevant. Recently enacted policies and programs in Iowa are listed where relevant in the policy options catalog notes. Additional details will be added to this document under each of the option descriptions, as they are provided.)

AFW-1. PRODUCTION OF FUELS AND ELECTRICITY

1.1 Expanded Use of Biomass Feedstocks for Electricity or Steam Production

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. This option is related to Agriculture, Forestry, and Waste Management 1.6 (AFW-1.6).

Recent Actions in Iowa

Alternative Energy Law (Iowa's Renewable Portfolio Standard)—Iowa requires its two investor-owned utilities—MidAmerican Energy and Alliant Energy Interstate Power and Light—to contract for a combined total of 105 megawatts (MW) of their generation from renewable-energy resources.

Fuel Mix Disclosure—Iowa's rate-regulated electric utilities must report annually to customers the percentage mix of fuel and energy used to produce electricity. The percentages for renewables must further be broken down into percentages of electricity generated by wind, solar, hydropower, biomass, and other resources. Each utility's annual report must also include an estimate of sulfur dioxide, nitrogen oxides, and carbon dioxide emissions for each fuel and resource.

Energy Research Grants—The Iowa Energy Center provides grants for energy research on topics that have strong relevance to Iowa.

1.2 In-State Liquid Biofuels Production

Increase production of ethanol and/or biodiesel fuel from agriculture and/or forestry feedstocks and/or municipal solid and other waste (raw materials) to displace the use of fossil diesel. Promote 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.

Recent Actions in Iowa

Renewable Fuel Standard (RFS)—The goal of the Iowa RFS is to replace 25% of gasoline in the state with biofuels (ethanol or biodiesel) by January 1, 2020. One provision of the standard is to require retailers to sell a certain percentage of renewable fuels as part of their total gasoline sales. Both biodiesel and ethanol count toward meeting the RFS.

Ethanol Tax Credit—A tax credit is available to retail service stations at which more than 60% of the total gallons of gasoline sold through metered pumps are blended with ethanol. Once station owners surpass the 60% threshold, they are eligible for a tax credit.

Alternative Fuels Tax—Ethanol-blended gasoline, including E85, is taxed at a rate lower than that for conventional fuel.

Biodiesel Tax Credit—Through December 31, 2011, retailers whose diesel sales are at least 50% biodiesel (B2 and higher blends) are eligible for a \$0.03 per gallon tax credit on each gallon of B2 or higher blend sold.

Biodiesel Use—A biodiesel fuel revolving fund will be used by the Iowa Department of Transportation (IDOT) for the purchase of biodiesel fuel for use in IDOT vehicles.

Energy Research Grants—The Iowa Energy Center provides grants for energy research on topics that have strong relevance to Iowa.

Alternative Fuel Production Loans—The Value-Added Agricultural Products and Processes Financial Assistance Program offers a combination of forgivable and traditional low-interest loans for business projects involving the production of biomass or alternative fuels. <http://www.iowalifechanging.com/business/vaapfap.html>

Alternative Fuel Production Tax Credits—The Enterprise Zone Program and the High Quality Job Creation Program offer state tax incentives to business projects for the production of biomass or alternative fuels. http://www.iowalifechanging.com/business/financial_assistance.html

1.3 On-Farm Manure Digesters / Other Waste Energy Utilization

Reduce methane emissions from livestock manure by installing anaerobic digester systems at Iowa concentrated animal feeding operations. Methane captured from the digesters is used to create heat or power, which offsets fossil fuel-based energy production and the associated greenhouse gas (GHG) emissions. Related to AFW-1.4 and AFW-1.5.

Recent Actions in Iowa

- † **Alternate Energy Revolving Loan Program (AERLP)**—The Iowa Energy Center provides zero-percent interest loans for up to half of the project cost, up to a maximum of \$250,000. <http://www.energy.iastate.edu/AERLP/index.htm>
- † **Energy Research Grants**—The Iowa Energy Center provides grants for energy research on topics that have strong relevance to Iowa. <http://www.energy.iastate.edu/Funding/gp-research.htm>

- † **Alternative Fuel Production Loans**—The Value-Added Agricultural Products and Processes Financial Assistance Program offers a combination of forgivable and traditional low-interest loans for business projects involving the production of biomass or alternative fuels. <http://www.iowalifechanging.com/business/vaapfap.html>
- † **Iowa DNR Anaerobic Digestion Outreach Program**—Recognizing the enormous opportunity for the wide-scale implementation of farm-scale and community-based anaerobic digester systems in Iowa, the Iowa Department of Natural Resources Energy and Waste Management Bureau set about promoting the digester concept to Iowa Communities having large concentrations of livestock production, large volumes of organic wastes, and large energy users. For more information, contact Allan Goldberg at 515-281-8912 or at allan.goldberg@dnr.iowa.gov.

1.4 Community Manure and Organic Waste Digesters for Commercial Gas Production and Electricity Generation

Reduce methane emissions from livestock manure and other organic waste streams by installing community-scale anaerobic digesters. The methane recovered from the process can be used to fuel large industrial processes or to generate electricity and thermal energy for community use, reducing the use of fossil fuels and the GHG emissions associated with that usage. Related to AFW-1.3 and AFW-1.5, although this option is focused at a community level, with the co-digestion of livestock manure and other organic substrates.

Recent Actions in Iowa

- † **Alternate Energy Revolving Loan Program (AERLP)**—The Iowa Energy Center provides zero-percent interest loans for up to half of the project cost, up to a maximum of \$250,000. <http://www.energy.iastate.edu/AERLP/index.htm>
- † **Energy Research Grants**—The Iowa Energy Center provides grants for energy research on topics that have strong relevance to Iowa. <http://www.energy.iastate.edu/Funding/gp-research.htm>
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- † **Iowa DNR Anaerobic Digestion Outreach Program**—Recognizing the enormous opportunity for the wide-scale implementation of farm-scale and community-based anaerobic digester systems in Iowa, the Iowa Department of Natural Resources Energy and Waste Management Bureau set about promoting the digester concept to Iowa Communities having large concentrations of livestock production, large volumes of organic wastes, and large energy users. For more information, contact Allan Goldberg at 515-281-8912 or at allan.goldberg@dnr.iowa.gov.

1.5 Lagoon Covers for Methane Capture and Utilization or Destruction

Reduce the amount of methane emissions using lagoon covers. Methane captured from the digesters can be used to create heat or power, which offsets fossil fuel-based energy production and the associated greenhouse gas (GHG) emissions. Related to AFW-1.3 and AFW-1.4.

Recent Actions in Iowa

- † **Alternate Energy Revolving Loan Program (AERLP)**—The Iowa Energy Center provides zero-percent interest loans for up to half of the project cost, up to a maximum of \$250,000. <http://www.energy.iastate.edu/AERLP/index.htm>
- † **Energy Research Grants**—The Iowa Energy Center provides grants for energy research on topics that have strong relevance to Iowa. <http://www.energy.iastate.edu/Funding/gp-research.htm>
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1.6 Biomass Energy Crop Production and Utilization

Increase the amount of energy crop production and utilization through the planning of energy purpose crops for generating electricity and displacing the use of fossil energy sources. This option is related to AFW-1.1.

Recent Actions in Iowa

Alternative Energy Law (Iowa’s Renewable Portfolio Standard)—Iowa requires its two investor-owned utilities—MidAmerican Energy and Alliant Energy Interstate Power and Light—to contract for a combined total of 105 MW of their generation from renewable-energy resources.

Fuel Mix Disclosure—Iowa’s rate-regulated electric utilities must report annually to customers the percentage mix of fuel and energy used to produce electricity. The percentages for renewables must further be broken down into percentages of electricity generated by wind, solar, hydropower, biomass, and other resources. Each utility’s annual report must also include an estimate of sulfur dioxide, nitrogen oxides, and carbon dioxide emissions for each fuel and resource.

Energy Research Grants—The Iowa Energy Center provides grants for energy research on topics that have strong relevance to Iowa.

1.7 Renewable Liquid Fuel Tax

Reduce the relative pump price of fuels with greater energy return on the basis of a combination of energy and carbon balance for the fuel produced.

Recent Actions in Iowa

None.

1.8 Reduction of Fossil-Derived Products and Energy in the Production of Biofuels

Decrease the use of fossil fuel in the production of biofuels, which will improve the GHG profile of in-state liquid biofuels production and consumption. Sustainability standards also need to be developed for low-carbon biofuels, so that producers are rewarded accordingly.

Recent Actions in Iowa

Energy Research Grants—The Iowa Energy Center provides grants for energy research on topics that have strong relevance to Iowa.

Alternative Fuel Production Loans—The Value-Added Agricultural Products and Processes Financial Assistance Program offers a combination of forgivable and traditional low-interest loans for business projects involving the production of biomass or alternative fuels. <http://www.iowalifechanging.com/business/vaapfap.html>

Alternative Fuel Production Tax Credits—The Enterprise Zone Program and the High Quality Job Creation Program offer state tax incentives to business projects for the production of biomass or alternative fuels. http://www.iowalifechanging.com/business/financial_assistance.html

1.9 Methane Management for GHS Reduction and for Energy Production

Reduce the amount of methane emissions from agriculture and farm operations. Energy captured from the activity can be used to create heat or power, which offsets fossil fuel-based energy production and the associated Greenhouse Gas (GHG) emissions. This option is closely related to 1.3 and 1.4 above.

Recent Actions in Iowa

None.

AFW-2. AGRICULTURE—LIVESTOCK**2.1 Manure / Methane Management Capture Utilization**

Implement manure management practices that reduce GHG emissions associated with manure handling and storage. Potential practices include but are not limited to manure composting (to reduce methane emissions) and improved methods for application to fields (for reduced nitrous oxide [N₂O] emissions). Application improvements include incorporation into soil instead of surface spray/spreading. Also implement digester and energy recovery projects at confined animal operations to both reduce methane emissions and utilize the energy to displace fossil fuels. To date, most of these projects have been implemented at dairy and swine operations.

Recent Actions in Iowa

None.

2.2 Changes in Animal Feed

Livestock emit methane directly as a result of digestive processes (enteric fermentation). Research suggests that changes in the energy content of feed and other dietary changes can reduce methane emissions from enteric fermentation. By optimizing nitrogen (protein) utilization in the feed, nitrogen levels in the manure can be reduced, which in turn reduces the potential for nitrous oxide emissions. This may include establishing low-methane-producing feed ration demonstration programs or sales tax exemption for low-methane-producing rations.

Recent Actions in Iowa

None.

2.3 Rotational Grazing / Improve Grazing Crops and/or Management

Heavy grazing can cause significant soil disturbance and result in carbon losses from soils. Rotational grazing where animals are moved from field to field on a regular basis reduces soil disturbance and maintains soil carbon levels. Rotational grazing also can improve plant vigor and enhance soil carbon levels.

Recent Actions in Iowa

None.

2.4 Utilize Biofilters to Control CAFO Emissions

The utilization of collection and control equipment such as biofilters at confined animal feeding operations (CAFOs) can reduce methane emissions.

Recent Actions in Iowa

None.

2.5 Increase Pasturing and Lower Densities

Increasing the area over which manure is deposited has the potential to reduce emissions of methane, since the manure is more likely to be decomposed aerobically than anaerobically.

Recent Actions in Iowa

None.

2.6 Manure Injection

Emissions are reduced through the direct injection of manure into the soil. This option is relevant to both fertilizer application and manure management.

Recent Actions in Iowa

None.

AFW-3. AGRICULTURE—CROP PRODUCTION / WATER, NUTRIENTS, AND SOILS**3.1 Soil Carbon Management**

The amount of carbon stored in the soil can be increased by the adoption of practices such as conservation and no-till cultivation. Reducing summer fallow and increasing winter cover crops are complementary practices that reduce the need for conventional tillage. By reducing mechanical soil disturbance, these practices reduce the oxidation of soil carbon compounds and allow more stable aggregates to form. Other benefits include reduced wind and water erosion, reduced fuel consumption, and improved wildlife habitat.

Recent Actions in Iowa

None.

3.2 Nutrient and Water Management

Improve the efficiency of fertilizer use and other nitrogen-based soil amendments through implementation of management practices. Excess nitrogen not metabolized by plants can leach into groundwater and/or be emitted to the atmosphere as nitrous oxide. Better nutrient utilization can lead to lower nitrous oxide emissions from run-off.

Recent Actions in Iowa

None.

3.3 Technology Improvements to Increase Efficiency

New technologies and cultivation methods have the potential to reduce GHG emissions when fossil fuel or electricity consumption can be reduced. Auto-steer guidance systems are an example. Also, auto swath technology, using global positioning systems (GPSs) to automatically turn the spray boom sections on or off when coming to an area of the field that has been sprayed or needs to be sprayed. This can be used for planting, fertilizing, etc. On odd shaped fields it can be a 3%–5% savings. http://www.agleader.com/products.php?Product=directcommand_1

Variable rate fertilizing and liming is also becoming more popular among farmers. The farmer has a local co-op grid sample the field and then variable rate applies the fertilizer or lime in the areas of the field that need it. The areas of the field that do not need the fertilizer or lime have none applied. This can be as much as a 50%–60% reduction in the amount of lime or fertilizer needed. http://www.agleader.com/products.php?Product=directcommand_g

Green Seeker normalized difference vegetation index (NDVI) technology. A farmer applies 50%–70% of his nitrogen at planting and then in season uses the Green Seeker to apply what the corn or wheat plant needs when it is growing. A more efficient way of applying nitrogen that results in less nitrogen being over-applied. This is a new technology that is still in its early testing stages, but looks to be promising. <http://www.ntechindustries.com/greenseeker-RT200.html>

Note that this option has a similar counterpart in Option 5.1 and is also is closely related to Option 3.7.

Recent Actions in Iowa

None.

3.4 Water Management

Improve the efficiency of water use through implementation of best management practices. Excess water can lead to run-off of nitrogen with subsequent emission to the atmosphere as N₂O. By managing and improving water consumption and nutrients spread on crops, there will be a minimal loss of carbon from the soil. Reduced water consumption can result in lower energy use for water pumping.

Recent Actions in Iowa

None.

3.5 Drainage Management

Improve drainage on agricultural lands to prevent ponding, which could lead to anaerobic soils and GHG emissions (methane).

Recent Actions in Iowa

None.

3.6 Biochar Production and Utilization

The application of biochar (i.e., charcoal) can lead to an increase in the soil carbon content leading to soil carbon stabilization and can even increase sequestration.

Recent Actions in Iowa

None.

3.7 Precision Nutrient Application

Auto-steer guidance systems are an example. Also, auto swath technology, using GPS to automatically turn the spray boom sections on or off when coming to an area of the field that has been sprayed or needs to be sprayed. This option is closely related to Option 3.3 (Technology Improvements to Increase Efficiency).

Recent Actions in Iowa

None.

3.8 Establish Low N₂O Emission, High Carbon Retention Demonstration Fields

Demonstrate the implementation of carbon-friendly management practices (including nutrient and soil management techniques to lower N₂O emissions and increase soil carbon retention) in fields to improve the understanding and confidence in these emerging techniques and practices.

Recent Actions in Iowa

None.

3.9 Promote Periodic Carbon Mapping Of Fields.

The promotion of carbon mapping will provide additional information on the effect of different management practices on carbon retention in agriculture fields. This will in turn improve the understanding and confidence in carbon-friendly techniques and practices.

Recent Actions in Iowa

None.

3.10 Organic Farming

Organic farming methods may tend toward an increased use of improved soil management practices including conservation tillage and the application of biochar. This option is designed to increase the acreage using soil management practices that lead to higher soil carbon content for both conventional and organic farming. In addition, some organic farming practices lower fossil fuel consumption through less intensive equipment use.

Recent Actions in Iowa

None.

3.11 Reduction of Fossil-Based Products and Energy in Agricultural Activities

Decrease the use of fossil fuel in agriculture activities (including using wind power to produce anhydrous ammonia), which will improve the GHG profile of agriculture products. Standards or incentives also need to be developed for low-carbon agriculture products, so that producers are rewarded accordingly.

Recent Actions in Iowa

None.

AFW-4. AGRICULTURE—CROP PRODUCTION / LAND MANAGEMENT**4.1 Land Use Management That Promotes Grassland Cover**

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 Conservation Reserve Program (CRP) lands covered in perpetuity.

Increased demand for corn-based ethanol and biodiesel feedstocks can act as an incentive for converting grassland to cropland. Adopt mechanisms to prevent these acres from either returning to conventionally tilled production or to suburban/urban development.

Recent Actions in Iowa

None.

4.2 Preserve Open Space / Agricultural Land

Reduce the rate at which agricultural lands are converted to developed uses, while protecting private property rights and responsibilities. This retains the above- and belowground carbon on these lands, as well as the carbon sequestration potential of these lands. Transportation emissions will be reduced indirectly through more efficient development and lower vehicle use. Agricultural land conversion may be prevented through conservation land grants and conservation easements facilitated through nonprofit land preservation organizations.

Recent Actions in Iowa

None.

4.3 Develop Land Cover Maps Identifying Marginal Lands Including Wetlands

Identify where marginal lands exist and where permanent cover should be targeted. This includes determining what constitutes marginal lands and identifying criteria to target land that will provide the most significant benefits.

Recent Actions in Iowa

None.

4.4 Reduce Incentives for Absentee Land Ownership and Develop Incentives for Farm Owner Operators

Farm owner and operators tend to manage land on a longer term basis and as such use more sustainable farming techniques including increasing rotations. This leads to less degradation and improved land and soil quality reducing emissions through improved soil carbon retention.

Recent Actions in Iowa

None.

4.5 Wetlands Protection / Conservation

Research should be conducted and programs should be adopted to identify and eliminate threats to the vast carbon pools currently stored in lands that hold high levels of soil organic carbon, such as peatlands and wetlands. A high percentage of carbon is stored in wetlands. Efforts are needed to protect these carbon reservoirs from the impacts of warmer and drier conditions and increased fire risk. Additional study is needed to understand GHG dynamics in the full range of wetland types in Iowa and management options to reduce the risk of catastrophic releases of stored GHGs from these systems.

Recent Actions in Iowa

None.

AFW-5. AGRICULTURE—FARMING PRACTICES**5.1 Reductions in On-Farm Energy Use**

Renewable energy can be produced and used on-site at agriculture operations. For example, installation of solar or wind power, use of hydro-powered generators for irrigation, and converting diesel farm equipment to liquid natural gas/compressed natural gas (LNG/CNG) or hybrid technology will reduce carbon dioxide emissions by displacing the use of fossil-based fuels. This could also include establishing renewable fuels demonstration farms or a fossil fuel tax for off-road use.

Recent Actions in Iowa

None.

5.2 On-Farm Energy Efficiency

In addition to reducing on-farm energy use, the use of energy efficient products should also be promoted. This could include improved grain dryers, heat exchangers (dairy), electric motors, and energy efficient building design.

Recent Actions in Iowa

None.

5.3 Promotion of Farming Practices That Achieve GHG Benefits

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

Recent Actions in Iowa

None.

5.4 Programs To Support Local Farming / Buy Local

Promote the production and consumption of locally produced agricultural goods, which displace the consumption of those transported from other states or countries. GHG reductions occur from reduced transportation-related emissions.

Recent Actions in Iowa

None.

5.5 Reduction of Fossil-Based Products and Energy in Agricultural Activities

Decreasing the use of fossil fuel in agriculture activities will improve the GHG profile of agriculture products. Standards or incentives also need to be developed for low-carbon agriculture products, so that producers are rewarded accordingly. This option is closely related to AFW-3.11.

Recent Actions in Iowa

None.

AFW-6. FORESTRY—PRODUCTION OF FUELS AND ELECTRICITY**6.1 Expanded Use of Biomass Feedstocks for Electricity, Heat, and Steam Production**

Increase the amount of biomass available from forests for generating electricity and displacing the use of fossil energy sources.

Recent Actions in Iowa

Alternative Energy Law (Iowa’s Renewable Portfolio Standard)—Iowa requires its two investor-owned utilities—MidAmerican Energy and Alliant Energy Interstate Power and Light—to contract for a combined total of 105 MW of their generation from renewable-energy resources.

Fuel Mix Disclosure—Iowa’s rate-regulated electric utilities must report annually to customers the percentage mix of fuel and energy used to produce electricity. The percentages for renewables must further be broken down into percentages of electricity generated by wind, solar, hydropower, biomass, and other resources. Each utility’s annual report must also include an estimate of sulfur dioxide, nitrogen oxides, and carbon dioxide emissions for each fuel and resource.

Energy Research Grants—The Iowa Energy Center provides grants for energy research on topics that have strong relevance to Iowa.

6.2 In-State Liquid Biofuels Production

Increase production of ethanol and/or biodiesel fuel from agriculture and/or forestry feedstocks (raw materials) to displace the use of fossil diesel. Promote 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 within the state give the highest benefits.

Recent Actions in Iowa

Renewable Fuel Standard—The goal of the Iowa RFS is to replace 25% of gasoline in the state with biofuels (ethanol or biodiesel) by January 1, 2020. One provision of the standard is to require retailers to sell a certain percentage of renewable fuels as part of their total gasoline sales. Both biodiesel and ethanol count toward meeting the RFS.

Ethanol Tax Credit—A tax credit is available to retail service stations at which more than 60% of the total gallons of gasoline sold through metered pumps are blended with ethanol. Once station owners surpass the 60% threshold, they are eligible for a tax credit.

Alternative Fuels Tax—Ethanol-blended gasoline, including E85, is taxed at a rate less than conventional fuel.

Biodiesel Tax Credit—Through December 31, 2011, retailers whose diesel sales are at least 50% biodiesel (B2 and higher blends) are eligible for a \$0.03 per gallon tax credit on each gallon of B2 or higher blend sold.

Biodiesel Use—A biodiesel fuel revolving fund will be used by IDOT for the purchase of biodiesel fuel for use in IDOT vehicles.

Energy Research Grants—The Iowa Energy Center provides grants for energy research on topics that have strong relevance to Iowa.

Alternative Fuel Production Loans—The Value-Added Agricultural Products and Processes Financial Assistance Program offers a combination of forgivable and traditional low-interest loans for business projects involving the production of biomass or alternative fuels. <http://www.iowalifechanging.com/business/vaapfap.html>

Alternative Fuel Production Tax Credits—The Enterprise Zone Program and the High Quality Job Creation Program offer state tax incentives to business projects for the production of biomass or alternative fuels. http://www.iowalifechanging.com/business/financial_assistance.html

6.3 Improved Energy Capture From Wood Waste Combustion

Reduce emissions and increase heat efficiency from heat sources such as wood-burning stoves and furnaces.

Recent Actions in Iowa

None.

6.4 Improved Commercialization of Biomass Gasification and Combined Cycle

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.

Recent Actions in Iowa

Energy Research Grants—The Iowa Energy Center provides grants for energy research on topics that have strong relevance to Iowa. Research grants are awarded in two broad categories: renewable energy and energy efficiency. Past grants have supported research in biofuels and biomass gasification.

AFW-7. FORESTRY—BIOMASS PROTECTION AND MANAGEMENT

7.1 Forest Protection—Reduced Clearing and Conversion to Non-Forest Cover

Reduce the rate at which existing forests are cleared and converted to developed uses. Much of the carbon stored in forest biomass and soils can be lost as a result of such land use conversion.

Recent Actions in Iowa

None.

7.2 Urban Forestry

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.

Recent Actions in Iowa

None.

7.3 Afforestation / Reforestation

Establish forests on land that has not historically been forested (e.g., agricultural land) (“afforestation”). Promote forest cover and associated carbon stocks by regenerating or establishing forests in areas with little or no present forest cover (“reforestation”). In addition, implement practices such as soil preparation, erosion control, and stand stocking to ensure conditions that support forest growth.

Recent Actions in Iowa

None.

7.4 Forest Management for Carbon Sequestration

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, 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.

Recent Actions in Iowa

None.

7.5 Mitigation of Forest Carbon Sequestration Loss and Emissions Due to Wildfire

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.

Recent Actions in Iowa

None.

7.6 Mitigation of Forest Loss Due to Insects and Disease

Programs that reduce insect damage to forests also reduce GHG emissions by maintaining the carbon sequestration achieved in healthy forests.

Recent Actions in Iowa

None.

7.7 Management of Wetlands To Improve Sequestration and/or Reduce Associated Methane Emissions

A high percentage of carbon is stored in wetlands. Efforts are needed to identify wetlands at risk of reemitting sequestered carbon dioxide and methane. Additional study is needed to understand GHG dynamics in the full range of wetland types in Iowa and management options to reduce the risk of catastrophic releases of stored GHGs from these systems. This option is closely related to Option 4.5.

Recent Actions in Iowa

None.

AFW-8. FORESTRY—WOOD PRODUCTS AND WASTE**8.1 Improved Mill Waste Recovery—Utilization of Sawmill Residues and Emissions**

Improve treatment and cleaning of waste materials from paper mills, which can then be reused to manufacture additional wood products. Ensure that sawmill by-products are recycled or beneficially used for energy. Promote opportunities for using mill CO₂ emissions to create chemical products such as carbonates.

Recent Actions in Iowa

None.

8.2 Improved Logging Residue Recovery

Use more efficient logging methods to fully utilize harvested trees, which will minimize carbon losses from wood damaged during harvesting and maximize the potential for carbon sequestration in harvested wood products. Process the logging remains efficiently.

Recent Actions in Iowa

None.

8.3 Expanded Use of Wood Products for Building Materials

Increase the amount of renewable wood products used for residential and commercial building. The carbon benefits associated with durable wood products need to be emphasized, including acknowledging that the use of wood products in place of other building materials can increase carbon sequestration in wood products and displace GHG emissions associated with processing high-energy input materials such as steel, plastic, and concrete. Reduction potential is enhanced by promoting the use of locally grown wood due to lower transport-associated emissions.

Recent Actions in Iowa

None.

8.4 Forestry Biochar

This option focuses on the application of biochar derived from forest products leading to increased soil carbon content, stabilized soil carbon, and even increased sequestration. This option is closely related to Option 3.6.

Recent Actions in Iowa

None.

AFW-9. WASTE MANAGEMENT—WASTE MANAGEMENT STRATEGIES

9.1 Advanced Recycling

Increase recycling and reduce waste generation in order to limit GHG emissions associated with landfill methane generation and with the production of raw materials, noting that different materials will exhibit different costs and benefits on a life-cycle basis. Increase recycling programs, create new recycling programs, provide incentives for recycling construction materials, develop markets for recycled materials, and increase average participation/recovery rates for all existing recycling programs.

Recent Actions in Iowa

Waste Management Programs—The State of Iowa runs several programs to promote waste reduction, recycling, and composting. These programs include Iowa DNR’s Solid Waste Alternatives Program, Pollution Prevention Services Program, and Iowa Waste Exchange, as well as Iowa Waste Reduction Center at the University of Northern Iowa.

9.2 Promotion of Bioreactor Technology

A bioreactor landfill 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, green-waste, 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.

Recent Actions in Iowa

None.

9.3 Source Reduction Strategies

Reduce the volume of waste from residential, commercial, and government sectors through programs that reduce the generation of wastes. Reduction of generation at the source reduces both landfill emissions and upstream production emissions.

Recent Actions in Iowa

Landfill Diversion Goals—The State of Iowa adopted the goal of diverting 50% of waste from landfills by the year 2000 from year 1988 levels.

9.4 Resource Management Contracting

Unlike traditional solid waste service contracts, resource management (RM) compensates waste contractors on the basis of performance in achieving an organization's waste reduction goals rather than on the volume of waste disposed. As a result, RM aligns waste contractor incentives with the goals to explore innovative approaches that foster cost-effective resource efficiency through prevention, recycling, and recovery.

Recent Actions in Iowa

None.

9.5 Waste Coal Recapture

Promote research and implementation of recovering waste coal. Waste coal is a usable material that is a by-product of previous coal processing operations. Emissions are reduced relative to the mining of new coal.

Recent Actions in Iowa

None.

9.6 Enhanced Management of Organic Waste

Reduces methane emissions associated with landfilling by reducing the biodegradable fraction of waste emplaced. Recently, an area of focus in the solid waste industry is increasing recycling of organic wastes (e.g., lawn and garden waste, food waste, and wood and paper waste) using different conversion technologies, including composting, anaerobic digestion, or hybrids of these technologies.

Recent Actions in Iowa

Waste Management Programs—The State of Iowa runs several programs to promote waste reduction, recycling, and composting. These programs include Iowa DNR's [Solid Waste Alternatives Program](#), [Pollution Prevention Services Program](#), and [Iowa Waste Exchange](#), as well as [Iowa Waste Reduction Center](#) at the University of Northern Iowa.

9.7 Promotion of New and Existing Technologies for Waste Energy Conversion

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).

Recent Actions in Iowa

None.

9.8 Reduce Residential Waste Burning, Including Organic Waste

The practice of burning garbage and organic waste, such as leaves and grass, produces greenhouse gas emissions along with toxins and particulate pollution (due to the low temperature of the burn). Measures including education can reduce emissions from these sources.

Recent Actions in Iowa

None.

9.9 Improve waste collection efficiencies.

Improve the efficiencies of waste collection through promoting communities to consolidate waste collection programs. Consolidated waste collection services provides improved GHG emissions compared to a subscription service which requires an larger number of vehicles to service the same number of households.

Recent Actions in Iowa

None.

AFW-10. WASTE MANAGEMENT—LANDFILL GAS STRATEGIES**10.1 Flare Landfill Methane at Non-NSPS (Smaller) Sites**

Encourage smaller landfills (non-New Source Performance Standards [NSPS]) that do not fall under environmental protection regulations to capture and flare methane gas. Flares are used to safely combust toxic and volatile gases from landfills and they convert methane gas, which has a relatively high global warming potential, to carbon dioxide.

Recent Actions in Iowa

None.

10.2 Methane and Biogas Energy Programs

Encourage and promote the use of anaerobic digesters and energy recapture for waste materials other than municipal solid waste at landfills (e.g., food processing waste). These projects will help prevent the emission of methane 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).

Recent Actions in Iowa

None.

10.3 Landfill Methane Energy Programs

Use the renewable energy created at landfills by anaerobic digesters (methane) to make electric power, space heat, or liquefied natural gas. Methane gas generation by landfills is a GHG reduction strategy that may benefit from a cap and trade system, encouraging landfills to install flares at a minimum and possibly achieve electric generation if the economic incentives are sufficient.

Recent Actions in Iowa

Methane Gas Conversion Property Tax Exemption—Under Iowa’s Methane Gas Conversion Property Tax Exemption, property used for methane gas collection and conversion into energy and connected with, or in conjunction with, a publicly owned sanitary landfill, is exempt from property tax. If other fuels are burned as well, the exemption is equal to the ratio of methane in the overall fuel mix.

AFW-11. WASTE MANAGEMENT—WASTEWATER MANAGEMENT ACTIVITIES

11.1 Energy Efficiency Improvements

Provide incentives for efficiency improvements. Encourage the setup of energy policies, energy audits, and energy cost tracking. Identify and implement energy improvements such as using energy efficient equipment and generating on-site power (e.g., solar power).

The term *efficiency improvements* is defined, within the scope of wastewater management activities, as

- Conversion of secondary aeration processes to fine bubble diffusion and optimization of oxygen transfer efficiencies,
- Research and development of diffuser cleaning protocols,
- Research and development to increase removal of chemical oxygen demand (COD) in primary treatment tanks and clarifiers,
- Evaluation of steam usage in plant processes and biofilters and optimization of use and find alternatives, and
- Research and development of options to optimize denitrification in secondary treatment.

Financial and performance analyses that may be conducted to assist the implementation of this option include

- Creation of a leveraged state revolving loan fund program to capitalize energy efficiency in municipal wastewater treatment plants (WWTPs),
- Establishment of a “fair cost of service” pricing tariff for transmission and distribution of remotely sited wind power,
- Optimization of energy management by requiring all utility meter data to be available without extra charge on a monthly basis,
- Provision of incentives to install interval meters to get whole load profile and make data available online and in real time, and
- Benchmarking of energy use per million gallons treated in Iowa to showcase good and efficient energy performance in this specific climate.

Recent Actions in Iowa

None.

11.2 Lower Waste Processing Needs

Develop and implement best practices for lowering water consumption and lowering waste production in the industrial, commercial, and residential sectors. Encourage and create incentives for research and development on methods and technologies to reduce water consumption and waste production. Provide education to reduce water consumption and waste production. Lower water consumption and waste production lead to lower GHG emissions.

Recent Actions in Iowa

None.

11.3 Install Digesters and Turbines or Engines

Provide incentives to install anaerobic digesters to treat municipal waste and create methane. Install turbines or reciprocating engines to generate electricity from the methane. Reductions occur via methane control and offsetting fossil energy use.

Recent Actions in Iowa

None.

11.4 Restoration of Soil Organic Carbon From Application of WWTP Biosolids

Evaluate the restoration and sequestration of carbon in soil through land application of biosolids. Research and develop a mechanism to remove algae from WWTP ponds and apply solids to restore and/or sequester soil carbon.

Recent Actions in Iowa

None.

11.5 Heat Recovery

Provide incentives to recover heat from wastewater influent or effluent through the use of heat pumps.

Recent Actions in Iowa

None.

11.6 Algae and Bio-Oils

Provide financial incentives to research the production of bio-oils from algae grown in wastewater effluents (which would reduce carbon, nitrogen, and phosphorus).

Recent Actions in Iowa

None.