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## Brief Description of Catalog Items

### Agriculture, Forestry, and Waste Management

### Technical Working Group

#### AFW-1 PRODUCTION OF FUELS AND ELECTRICITY

##### 1.1 Expanded Use of Biomass Feedstocks for ~~Energy~~ **Electricity and Steam** Production

**PRIORITY RECOMMENDATION:** AFW-1 (including the two additional subsets)

Increase the amount of biomass available for generating electricity **and heating** and displacing the use of fossil energy sources. Local electricity or steam production yields greatest net energy payoff.

*Recent Actions in MD: Renewable Portfolio Standard requires that 9.5% of all electricity be from renewable sources by 2022. Biomass, solar and wind are in Tier 1. Renewable Electricity Production credit (need more information). One private proposal (Fibersure) intends to use forest residue and chicken manure for power production. There are currently a few small biomass plants in operation in MD.*

##### 1.1.2 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 MD: Renewable Fuels Initiative Act provides incentives for biofuels produced by small grain, soybean and other agricultural products. There are caps in place: ethanol - 15mm gallons with 10mm being distilled from small grains; biodiesel - 5mm gals. with 2.0mm from soybeans. Farmers have option of investing in biodiesel plants. The Incentive program ends in 2017. There is a Renewable Fuels Taskforce at the state level. Maryland Green Producers are trying to build an ethanol plant in MD - on-going for 10 years. There is a biodiesel mixing station on the lower shore in MD. Ethanol and biofuels plants are planned in Norfolk VA and DE.*

### **1.1.3 Manure Digesters/Other Waste Energy Utilization**

Reduce the amount of methane emissions from livestock manure by installing manure digesters on livestock operations. Energy from the manure digesters is used to create heat or power, which offsets fossil fuel-based energy production and the associated Greenhouse Gas (GHG) emissions.

*Recent Actions in MD: Clean Energy Incentive Act includes incentives for methane use in heat and electricity production. There are no digesters in MD yet as they are too expensive to install in individual small to medium operations (less than 1000 head).*

## **AFW-2 AGRICULTURE – Livestock**

### **2.1.1. Manure Management: Manure Utilization**

### **2.1.2. Manure Management: Manure/Methane Capture**

2.1.1. 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 emissions). Application improvements include incorporation into soil, instead of surface spray/spreading.

2.1.2. 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 dairies and swine operations.

*Recent Actions in MD: The Clean Energy Incentive Act includes incentives for methane use in heat and electricity production.*

## **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 reduce the potential for nitrous oxide emissions.

*Recent Actions in MD:*

## **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 enhances soil carbon levels.

*Recent Actions in MD:*

## **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 MD:*

## 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 versus anaerobically.

*Recent Actions in MD: The MD Nutrient Management Act dictates how manure is to be spread. Note: There are not a lot of suitable lands available for increased acreage for spreading and the amount of active agricultural lands is shrinking annually.*

## AFW-3 AGRICULTURE – CROP PRODUCTION

### 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 complimentary practices that reduce the need for conventional tillage. In addition, the application of biochar (i.e., charcoal) may also increase soil carbon content and stabilize soil carbon. 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 MD: MD is the national leader in no-till agriculture (95% no-till) and winter cover crop planting. Funding is available at the state level to assist.*

### 3.2 Advanced Nutrient 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 N<sub>2</sub>O. Better nutrient utilization can lead to lower nitrous oxide emissions from run-off.

*Recent Actions in MD: The Maryland Nutrient Management Act of 1998 contains a regulatory enforcement program. A Nutrient Management Plan is required with a minimum level of action. BMP's could be implemented in addition. The Natural Resources Conservation Service (NRCS) and the MD Department of Agriculture are already looking at options for nutrient trading and expect to have a recommendation this fall.*

### 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 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 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](http://www.agleader.com/products.php?Product=directcommand_1).

Variable rate fertilizing and liming is also becoming more popular among Maryland farmers. The farmer has a local Co-op grid sample the field and then variable rate applies the fertilizer or lime as need 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 on them. This can be as much as 50 to 60% reduction in the amount of lime or fertilizer needed.

[http://www.agleader.com/products.php?Product=directcommand\\_g](http://www.agleader.com/products.php?Product=directcommand_g).

Green Seeker NDVI technology. A farmer applies 50 to 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 and will result 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.

*Recent Actions in MD: Some farmers are using GPS technologies but the extent of use is unknown..*

### 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 N<sub>2</sub>O. 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 MD: Much work has gone into water management, tributary management strategies, etc. under a plethora of regulations and initiatives.*

### 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 MD: There are a whole series of drainage ditches in MD to keep farm land open and arable. TWG recommends dropping this option*

## AFW-4 AGRICULTURE-LAND USE CHANGE

### 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 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 MD: Maryland does not participate in the Conservation Reserve Program (CRP) but rather in the Conservation Reserve Enhancement Program (CREP). This program does not take whole fields out of production but instead focuses on enhancing buffers, swales and edges.*

*Discussions surrounding whether and how these perennial cover crops may be harvested for biomass feedstocks are taking place at the state level.*

### 4.2 Preserve Open Space/Agricultural Land/Forests

**PRIORITY RECOMMENDATION: Combined with 7.1 Reduced Forest Clearing and Conversion to Non-Forest.**

Reduce the rate at which agricultural lands are converted to developed uses, while protecting private property rights and responsibilities. This retains the above- and below-ground 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 non-profit land preservation organizations.

*Recent Actions in MD: MD has a many diverse open space initiatives (three major and six smaller programs) which have received a lot of public attention and support. Over \$200 million a year is spent in land/open space conservation. MD state government also has established a Cabinet level position to track the state implementation and progress on Chesapeake Bay plans. However, agriculture, forests and open space continue to decline.*

**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 LNG/CNG or hybrid technology will reduce carbon dioxide emissions by displacing the use of fossil based fuels.

*Recent Actions in MD: The Clean Energy Incentive Act may provide incentives for installing renewable energy systems. One of many of Maryland Transportation Initiatives encourages diesel retrofits. (More research is necessary to find specific language that would directly relate to this policy option.) Maryland Farm Energy Audit Program can assist in assessing energy use and efficiency on farms. Farmers are currently using some alternative fuels but amount is unknown.*

**5.2 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 to conventional farming, depending on the specific practices implemented (e.g., use of no-till cultivation and fewer chemical inputs).

*Recent Actions in MD:*

**5.3 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 MD: MD Dept of Ag revitalized and is actively promoting a Buy Local program.*

**AFW-6 FORESTRY – PRODUCTION OF FUELS AND ELECTRICITY IN FORESTRY AND URBAN TREE MANAGEMENT BIOMASS**

### 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 MD:*

### 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 in state give the highest benefits.

*Recent Actions in MD: The Renewable Fuels Incentive Act prescribes incentives for the use of biomass to produce ethanol and biodiesel. Currently forestry biomass has a 5 cents per ton incentive while small grains has a 20 cents per ton pay back.*

### 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 MD:*

### 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 MD:*

## AFW-7 FORESTRY – BIOMASS PROTECTION AND MANAGEMENT

### 7.1 Forest Protection – Reduced Clearing and Conversion to Nonforest Cover

**PRIORITY RECOMMENDATION:** Combine with 4.2 Protect Open Space and Ag Lands.

Reduce the rate at which existing forest 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 a land use conversion.

*Recent Actions in MD:*

### 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 MD: MD is required to complete a State Improvement Plan with ozone stipulations due next year. In 2007, use of urban forestry for ozone mitigation was a new voluntary measure – a first for a state.*

*Baltimore and Washington Metro have an Air Quality Plan that covers 2,000 square miles. Biomass could be utilized – see AFW6 above. RGGI Urban tree canopy carbon offsets under consideration.*

### 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 MD: MD utilizes the Forest Conservation Act, which requires replacing lost forest land due to new development. Mitigation strategies are required. There are additionally about three dozen laws or programs that support reforestation.*

*RGGI has an Afforestation offset model rule. State has taken this RGGI model rule and is shaping a MD specific rule (see [www.rggi.org](http://www.rggi.org) under Offset Rules).*

### 7.4 Forest Management for Carbon Sequestration

#### PRIORITY RECOMMENDATION

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.

Forests are significant for MD however forest cover is disappearing at the rate of perhaps 40-50 acres a day. We need to ensure long-term health and productivity of forests. From a carbon emissions perspective, this is an area we can be proactive.

*Recent Actions in MD:*

### 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 MD: There has only been one major wildfire in the last year and a half. Accordingly and due to resource prioritization, the USFS is reducing the area in which they will respond to forest fires. This option is of less concern than 7.6.*

## 7.6 Mitigation of Forest Loss Due to Insects/Disease

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

*Recent Actions in MD: The biggest problems have been invasive species and pest management. MD is losing many trees through insects and disease and invasive plants driving out native species.*

## AFW-8 FORESTRY – WOOD PRODUCTS AND WASTE

### 8.1 Improved Mill Waste Recovery – Utilization of Sawmill Residues & Emissions

Improve treatment and cleaning of waste materials from paper mills, which can then be re-used to manufacture additional wood products. Ensure that sawmill byproducts are recycled or beneficially used for energy. Promote opportunities for using mill CO<sub>2</sub> emissions to create chemical products, such as carbonates. **Combined heat and power provide better economies of scale and efficacy than singular uses.**

*Recent Actions in MD: One paper mill capturing a lot of waste and are looking at doing more for energy production from waste using a thermo-chemical process. A State prison (8<sup>th</sup> largest in its class) uses 100% wood power for steam, heat, energy. Quite a few sawmills are marketing residues robustly for diverse uses, a growing share could be converted to energy production depending on price. Currently no Fuels for School type of program to use wood residues for heat.*

### 8.2 Improved Wood Waste and 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. **Use effective wood waste recovery from sources such as pallets, yard wastes, arbor care, etc. in rural and urban areas for energy feedstocks. (Counterpart to AFW 1)**

*Recent Actions in MD: Not including logging residue, just wood that shows up at recycling centers is estimated about 600m tons annually. High potential feedstock source.*

### 8.3 Expanded Use of Wood Products for Building Materials

Increase the amount of renewable wood products used for residential and commercial building. 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 MD: Maryland has been a LEED leader, but hasn't given all the credit to wood products, especially local woods (This is an issue in several states.)*

#### 8.4 Reduction in Logging Industry Energy Use

Renewable energy can be produced and used on-site at logging and milling operations. For example, distillation of residue for ethanol production, use of wood residue for electricity generation, and using biodiesel in logging equipment will reduce carbon dioxide emissions by displacing the use of fossil based fuels. Conservation is an important part of this option as well.

#### 8.4 Support Buying Local Wood Products

Wood products, for construction, furniture or other value-added wood products will enhance local economies while reducing carbon emissions by reducing transportation costs and sequestering carbon in those products.

### AFW-9 WASTE MANAGEMENT – WASTE MANAGEMENT STRATEGIES

#### 9.1 Advanced Recycling

Increase recycling and reduce waste generation in order to limit greenhouse gas emissions associated with landfill methane generation and with the production of raw materials. Increase 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.

*Recent Actions in MD: Electronics recycling is gaining traction. New advances are being seen in recovery of industrial gases from foam products.*

#### 9.2 Promotion of Bioreactor Technology

A bioreactor 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.

*Recent Actions in MD: The Clean Energy Incentive Act includes incentives for methane use in heat and electricity production.*

#### 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 as well as upstream production emissions.

*Recent Actions in MD:*

#### 9.4 Resource Management Contracting

Unlike traditional solid waste service contracts, resource management (RM) compensates waste contractors based on performance in achieving an organization's waste reduction goals rather than 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 MD:*

### **9.5 Waste Coal Recapture**

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

*Recent Actions in MD: More information is needed on coal waste recovery especially since MD's coal is low quality with a high sulfur content.*

### **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 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.

*Recent Actions in MD:*

### **9.7 Promotion of New & 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 MD: The Clean Energy Incentive Act includes incentives for methane use in heat and electricity production.*

## **AFW-10 WASTE MANAGEMENT – LANDFILL GAS STRATEGIES**

### **10.1 Flare Landfill Methane at non-NSPS (smaller) sites**

Encourage smaller landfills 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 MD: 48 sites are controlled so application of programs could be focused*

### **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 MD: The Clean Energy Incentive Act includes incentives for methane use in heat and electricity production that may apply here, but there is concern from small potential producers that digester costs are not adequately off set by current incentives.*

### 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.

*Recent Actions in MD: The Clean Energy Incentive Act includes incentives for methane use in heat and electricity production that may apply here.*

## AFW-11 WASTE MANAGEMENT – WASTEWATER MANAGEMENT ACTIVITIES

### 11.1 Energy Efficiency Improvements

Provide incentives for efficiency improvements. Encourage the set up 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.
- Evaluate steam usage in plant processes and biofilters. Optimize use and find alternatives.
- 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 WWTPs.
- Establish a “fair cost of service” pricing tariff for transmission and distribution of remotely sited wind power.
- Facilitate optimization of energy management by requiring all utility meter data to be available without extra charge on a monthly basis.
- Provide incentives to install interval meters to get whole load profile and make data available online and in real-time.
- Conduct benchmarking of energy use per million gallons treated in Maryland to showcase good and deficient energy performance in this specific climate.

*Recent Actions in MD: Maryland is a member of the Regional Greenhouse Gas Initiative (RGGI – called Reggie), a consortium of 10 northeastern and mid-Atlantic states committed to reducing greenhouse gases through a cap and trade program for electricity producers. Reducing*

*demand has specific emphasis in Maryland, thus energy efficiency and conservation play a strong role.*

### **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/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 MD:*

### **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 MD: The Clean Energy Incentive Act includes incentives for methane use in heat and electricity production.*

### **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/sequester soil carbon.

*Recent Actions in MD:*

### **11.5 Heat Recovery**

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

*Recent Actions in MD:*

### **11.6 Algae and Bio-Oils**

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

*Recent Actions in MD:*