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

Draft Option #	Draft Policy Option Name	Straw Proposal Volunteers
AFW-1	Forest Retention – Reduced Conversion of Forested to Non-Forested Land Uses	Nick Wiley Doria Gordon - alternate
AFW-2	Afforestation and/or Restoration of Non-forested Lands a. Forest Landscape b. Urban Forestry	Nick Wiley – Forest Landscape Celeste White – Urban Forestry
AFW-3	Forest Management for Carbon Sequestration	Mike Branch
AFW-4	Expanded Use of Forestry, Agriculture and Waste Management Biomass Feedstocks for Electricity, Heat and Steam Production a. Long-Rotation Forests b. Short-Rotation Forests c. Other Energy Crops d. MSW Biomass e. Agriculture and Forestry Residues	Gary Peter – a, b, e (forestry) c - TBD David McConnell – d Andrew Walmsley – e (ag)
AFW-5	Promotion of Farming Practices that Achieve GHG Benefits a. Soil Carbon Management b. Land Use Management that Promotes Permanent Cover c. Nutrient Management d. Improved Harvesting Methods to Achieve GHG Benefits	Andrew Walmsley
AFW-6	Reduce the Rate of Agricultural Land and Open Green Space Conversion to Development	Jay Levenstein
AFW-7	In-State Liquid/Gaseous Biofuels Production a. Long-Rotation Forests b. Short-Rotation Forests c. Other Energy Crops d. MSW Biomass e. Agriculture and Forestry Residues	Gary Peter – a, b, e (forestry) c - TBD David McConnell – d Andrew Walmsley – e (ag)

Draft Option #	Draft Policy Option Name	Straw Proposal Volunteers
AFW-8	Promotion of Advanced Municipal Solid Waste Management Technologies (including Bioreactor Technology)	Marc Bruner David McConnell - alternate
AFW-9	Improved Commercialization of Biomass to Energy Conversion & Bio-Products Technologies a. Manure Digestion/Other Waste Energy Utilization b. WWTP Biosolids Energy Production c. Other Biomass Conversion Technologies d. Bio-Products Technologies & Use	Andrew Walmsley – a DEP and Kevin Robertson – b c – TBD d – TBD
AFW-10	Programs to Support Local Farming/Buy Local	Jay Levenstein

Summary List of Draft Priorities for Analysis—2015 and 2025

Option No.	Policy Option	GHG Reductions ($MMtCO_2e$)			Net Present Value 2009–2025 (Million $)	Cost-Effectiveness ($/tCO_2e$)	Level of Support
		2015	2025	Total 2009–2025			
AFW-1	Forest Retention—Reduced Conversion of Forested to Non-Forested Land Uses	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*	Pending
AFW-2	Afforestation and Restoration of Non-Forested Lands	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*	Pending
	A. Forest Landscape						
	B. Urban Forestry						
AFW-3	Forest Management for Carbon Sequestration	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*	Pending
AFW-4	Expanded Use of Agriculture, Forestry, and Waste Management (AFW) Biomass Feedstocks for Electricity, Heat, and Steam Production	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*	Pending
	A. Long-Rotation Forests						
	B. Short-Rotation Forests						
	C. Other Energy Crops						
	D. Municipal Solid Waste (MSW) Biomass						
	E. Agriculture and Forestry Residues						
AFW-5	Promotion of Farming Practices That Achieve GHG Benefits	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*	Pending
	A. Soil Carbon Management						
	B. Land-Use Management That Promotes Permanent Cover						
	C. Nutrient Management						
	D. Improved Harvesting Methods to Achieve GHG Benefits						
AFW-6	Reduce the Rate of Agricultural Land and Open Green Space Conversion To Development	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*	Pending
AFW-7	In-State Liquid/Gaseous Biofuels Production	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*	Pending
	A. Long-Rotation Forests						
	B. Short-Rotation Forests						
	C. Other Energy Crops						
	D. MSW Biomass						
	E. Agriculture and Forestry Residues						
AFW-8	Promotion of Advanced Municipal Solid Waste (MSW) Management Technologies (Including Bioreactor Technology)	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*	Pending
AFW-9	Improved Commercialization of Biomass to Energy Conversion and Bio-Products Technologies	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*	Pending
	A. Manure Digestion/Other Waste Energy Utilization						

Option No.	Policy Option	GHG Reductions ($MMtCO_2e$)			Net Present Value 2009–2025 (Million $)	Cost-Effectiveness ($/tCO_2e$)	Level of Support
		2015	2025	Total 2009–2025			
	B. WWTP Biosolids Energy Production						
	C. Other Biomass Conversion Technologies						
	D. Bio-Products Technologies & Use						
AFW–10	Programs to Support Local Farming/Buy Local	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*	Pending
	Sector Totals						
	Sector Total After Adjusting for Overlaps*						
	Reductions From Recent Actions	–	–	–	–	–	
	Sector Total Plus Recent Actions	–	–	–	–	–	

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

* See below for discussion of overlap adjustments

Note that negative costs represent a monetary savings.

Overlap Discussion:

The amount of carbon dioxide (CO_2) emissions reduced or sequestered and the costs of a policy option within the Agriculture, Forestry, and Waste (AFW) sector may overlap with some of the quantified benefits and costs of policy options within other sectors.

Every effort will be made to determine where those overlaps occur and to eliminate double counting. As displayed in the chart above, the AFW sector totals will be reduced accordingly.

Biomass Supply:

Several options call for a supply of in-state biomass. The supply and demand for state biomass resources are assessed in Table 1 below to ensure there are sufficient resources to meet the policy option goals.

Table 1. Florida Climate Action Team policies: biomass supply and demand assessment

Biomass Resource	Annual Biomass Supply (Dry Tons)	Notes
Logging Residue	1,300,000	Source: *Florida Biomass and Bioenergy Overview*, Southeastern Sun Grant Initiative, May 2007.
Urban Wood Waste	4,600,000	Source: *Florida Biomass and Bioenergy Overview*, Southeastern Sun Grant Initiative, May 2007.
Primary Mill Residue (Unused)	4,000	2005 NREL Report. Derived from the USDA Forest Service's Timber Product Output database for 2002, includes mill residues burned as waste or landfilled.
Agricultural Residue	3,597,000	2005 NREL Report. Estimated using 2002 total grain production, crop to residue ratio, moisture content, and taking into consideration the amount of residue left on the field for soil protection, grazing, and other agricultural activities.
Switchgrass		2005 NREL Report estimates a potential 507,000 tons of switchgrass could be grown on CRP lands.
Willow and Hybrid Poplar		2005 NREL Report estimates a potential 389,000 tons of willow or hybrid poplar could be grown on CRP lands.
Other Woody Energy Crops		Potential to grow 2,080,000 tons on marginal mining lands. Estimated based on 160,000 acres (from Southeastern Regional Biomass Energy Program 2003 Annual Report*) and 13 dry tons/acre.†
Poultry Litter		
Municipal Solid Waste (MSW) Fiber		
Wood Pulp		
Yard and Landscape Waste Debris		
Total Annual Biomass Supply		
AFW-4. Expanded Use of Agriculture, Forestry, and Waste Management (AFW) Biomass Feedstocks for Electricity, Heat, and Steam Production	To be quantified	
AFW-7. In-State Liquid/Gaseous Biofuels Production	To be quantified	
AFW-9. Improved Commercialization of Biomass to Energy Conversion and Bio-Products Technologies	To be quantified	
Total Annual Biomass Demand		

Comment [smr1]: Action Team asked whether this number includes sugar cane bagasse.

USDA = U.S. Department of Agriculture; NREL = National Renewable Energy Laboratory; CRP = Conservation Reserve Program.

* Southern States Energy Board, Southeastern Regional Biomass Energy Program. 2003 (Oct.). 3rd year field operations & maintenance support for Central Florida short rotation woody crop (SRWC) tree farm. Available at: http//www.treepower.org/papers/annualreport-2003.doc

† Midpoint between high (16 dry tons/acre) and low (10 dry tons/acre), estimates from University of Florida (UF), http://www.treepower.org/yields/main.html.

AFW-1. Forest Retention—Reduced Conversion of Forested to Non-Forested Land Uses

Policy Description

Florida has one of the highest growth rates in the nation. By 2060, it is projected that approximately 7 million acres of additional land will be converted from rural to urban uses in Florida, including almost 2.7 million acres of current agricultural lands and 2.7 million acres of existing habitat. This growth will create enormous pressure to develop the landscape. Developed areas contain lower amounts of biomass and its associated carbon. Developed areas also sequester less CO_2 than forested areas.

Furthermore, when landowners don't have incentive to retain ownership, they often not only sell for development, but also sell a forested tract by smaller parcels, making effective forest management impractical. Managed stands sequester carbon faster than non-managed stands, and sequester carbon long-term in durable products.

This policy seeks to reduce the rate at which existing forests are cleared, fragmented, and converted to developed uses, while also providing mechanisms that ensure healthy forest management. Much of the carbon stored in forest biomass and soils can be lost as a result of such a land-use conversion. There are a variety of public and private conservation programs, which can be used to halt this landscape conversion. This policy will emphasize the value of existing forest cover and their importance as carbon stocks.

Note that this policy has overlap with AFW-2 Afforestation and Restoration of Non-Forested Lands, and AFW-3 Forest Management for Carbon Sequestration.

Policy Design

Goals: Stabilize current statewide forest-cover acres and achieve no net loss in carbon stocks by 2015.

Timing: See above.

Parties Involved: Florida private forestland owners, Florida Division of Forestry (DOF), Florida Forestry Association (FFA), Florida Fish and Wildlife Conservation Commission (FWC), University of Florida (UF) Institute of Food and Agricultural Sciences (IFAS) extension, Natural Resources Conservation Service (NRCS), nongovernmental agencies, Regional Planning Councils (RPCs), other state land management agencies, U.S. Forest Service (USFS), U.S. Fish and Wildlife Service (US FWS), U.S. Army Corp of Engineers (USACE), other federal land management and technical assistance agencies, the Nature Conservancy, forest industry, real estate investment trusts (REITs), timber investment management organizations (TIMOs), and private landowners, state government, U.S. federal government.

Other: Based on the USFS Forest Inventory and Analysis (FIA) data, Florida lost 74.3 thousand acres of forestland (16,221.2 to 16,146.9 million acres), resulting in a 0.5% forestland lost from

1995 to 2005. During the same time period, the timberland (forestland capable of producing merchantable timber) acreage increased by 901.2 thousand acres (14,650.7 to 15,551.9 million acres), which corresponds to a 6.2% increase over a 10-year period. However, that does not mean forestland conversion is not occurring in Florida. It means that for this period of time acreage was planted with trees, offsetting almost all of the forestland converted to other land uses throughout the state, and that some of the acreage previously classified as forestland is now classified as timberland.

Comment [smr2]: CCS needs input from the TWG on whether to use this rate of loss in the I&F and quantification of this option or the rate of loss inferred from the recent UF Study of FL Development out to 2060 (much higher level of ~49,000 acres/yr)

Implementation Mechanisms

Achieve "no net loss" or an increase in forest carbon stocks through local land use planning, conservation easements, federal and state incentive programs available to family forest landowners, outreach, favorable tax incentives and disincentives, and other relevant forest retention mechanisms (eg. Carbon trading).

Provide technical and material assistance to forest land owners to encourage them to keep forest land in forest cover. This can be accomplished by maintaining and whenever possible increasing ongoing forestry assistance programs. Current forest assistance programs are listed below:

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- **Forest Stewardship Program** – Provides resource management plans and technical guidance to encourage multiple use management of private lands. Multiple use includes production of a variety of forest products, improved wildlife habitat, increased recreational opportunities, improved aesthetics, and cleaner air and water. This program is partially funded by federal dollars that are expected to continue to decline.
- **Conservation Reserve Program** – Provides incentives to reduce soil erosion and protect water quality by returning lower quality farm ground to forest cover. This program is federally funded with DOF foresters providing technical guidance of reforestation practices.
- **Environmental Quality Incentive Program** - Provides incentives to reduce soil erosion and protect water quality through a wide variety of practices. This program is federally funded with DOF foresters providing technical guidance for reforestation and forest productivity enhancement practices. The pending farm bill includes language to increase the emphasis on forestry practices. Support is required to insure that the forestry language remains a priority and a new Farm Bill is passed.
- **Forest Land Enhancement Program** – Provided federal cost share dollars to private landowners to improve current forest condition, and assistance in reforestation. These practices reduced threats from wildfire, insects and disease while increasing forest productivity. This program has expired and is not likely to receive federal funding in the future.
- **Cooperative Forestry Assistance** – County foresters are available to assist landowners in forest management planning. County foresters provide technical guidance on how to improve and protect forest health and productivity.
- **Forest Health, Southern Pine Beetle Program** – The DOF offers technical and financial assistance to landowners to reduce risks associated with insect and disease problems. This program is partially funded with federal dollars.
- **Urban and Community Forests** – Provides federal dollars to encourage cities to develop tree planting and maintenance programs. Urban trees reduce heat build up in cities, reduce energy consumption for cooling by providing shade, cleaning air, producing oxygen, improving aesthetics, and storing carbon. Blocks of trees near cities can serve many of the above functions as well as

providing: recreational areas, storm water retention and filtration, ground water recharge, reduced water treatment costs, increased water supply, etc.

Related Policies/Programs in Place

Florida has aggressively pursued the acquisition of conservation lands over the past 25 years preserving more than 2 million acres with more than $6 billion in funding for the Preservation 2000 program and its successor, the Florida Forever program.

The Natural Resources Conservation Service's Farm Bill programs (CRP, GRP, WHIP, EQIP) provides financial incentive to landowners to maintain forest lands.

The U.S. Fish and Wildlife Service's Partners for Fish and Wildlife supports restoration and conservation of high priority habitats by forming partnerships with private landowners.

The Fish and Wildlife Commission's Landowner Assistance Program provides habitat management recommendations aimed at forming long-term partnerships with private landowners that lead to the restoration and conservation of high priority habitats, identified in Florida's Wildlife Action Plan http://myfwc.com/wildlifelegacy/. Recommendations include restoring native groundcover, overstory species, planting new pine stands at low densities, and thinning existing stands to benefit carbon sequestration, wildlife habitats, and forest health.

FL Farm Bureau's Carbon Trading program is now in effect and offers incentive to financial incentive to landowners for maintaining forest lands.

Amendment 4 would provide additional tax incentives to landowners who retire development rights through a conservation easement.

In 2006, Florida had 16.7 million acres of forest land of which nearly 16.0 millions acres were classified as timberland (capable of producing merchantable timber). The Florida Division of Forestry (DOF) manages 1.0 million acres of forest land on 34 state forests, and provides technical assistance to other state and local agencies which manage an additional 1.9 million acres of forest land. Through various other programs (see below) DOF provides technical assistance to individual and family landowners who control nearly 5 million acres of Florida's forest lands. Federal forest lands constitute 2.1 million acres, forest industry owns 1.6 million acres, non-industrial private forests in corporate ownership constitute nearly 5 million acres, and other ownership equals 0.1 million acres of forest lands in Florida.

Besides managing state forests, DOF is working with family and individual forest landowners, who control 5 million acres (30%) of Florida's forest lands, to advocate forest management aimed at well stocked forests for the duration of a rotation from tree planting to final harvest. Well stocked forests have a basal area of 60 to 80 sq ft per acre. When forests reach a merchantable basal area of approximately 100 to 150 sq ft per acre, they are thinned back to the 60 to 80 sq ft range to sustain optimal tree growth and forest health. After final harvest, pine forests should be replanted at a minimum of 605 or 726 trees per acre to assure adequate survival, tree growth, tree form, and subsequently timber quality and quantity. Planting at the recommended densities provides an opportunity for thinning in the middle of a 25 to 30 year rotation making wood available for energy production or traditional forest products. More trees

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at planting and adequate forest stocking means more CO_2 sequestered by rapidly growing young trees and more opportunities for woody biomass harvest for energy production and other uses.

Types(s) of GHG Reductions

Avoided CO2 emissions in case of retained forests

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When forests are harvested and not replanted most of the biomass is converted back to CO2. For some long lived products it takes decades to revert back to CO2, but for other like paper and packaging materials the "decaying" process can be measured in months or years. Therefore, whenever the forest is retained "on the stump" the CO2 emissions are avoided.

Estimated GHG Reductions and Net Costs or Cost Savings

TBD—[Center for Climate Strategies (CCS) should provide a worksheet and other reference material, as needed, for transparency.]

Data Sources: [TBD by CCS on Technical Work Group (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 TWG]

Additional Benefits and Costs

TBD—[as needed and approved by the TWG]

TWG Suggestion:

Feasibility Issues

TBD—[as needed and approved by the TWG]

Status of Group Approval

Pending.

Level of Group Support

TBD—[blank until Action Team meeting #5]

Barriers to Consensus

TBD—[blank until final vote by the Florida Action Team]

AFW-2. Afforestation and Restoration of Non-Forested Lands

Policy Description

Establish forests on land that has not historically been forested (e.g., agricultural land, "afforestation"). Promote forest cover and associated carbon stocks by regenerating lands previously forested ("reforestation"). In addition, implement practices (e.g., soil preparation, erosion control, and stand stocking) to ensure conditions that support forest growth. Additional benefits include public recreation, water quality, wildlife habitat, and enhanced biodiversity.

Maintain and improve the health and longevity of tree canopy cover in urban and residential areas to protect and enhance the carbon stored in tree biomass, to absorb air pollution and increase oxygen supplies, and to reduce heating and cooling needs as a result of increased shading. Promote use of software programs that can be used by cities and communities to track and assess the ecological and economic benefits of urban forestry.

Note that this policy has overlap with AFW-1: Forest Retention—Reduced Conversion of Forested to Non-Forested Land Uses and AFW-3 Forest Management for Carbon Sequestration.

Policy Design

Goals: TBD

Forested Landscape: Increase the area of forested lands in Florida by 2.5% annually through 2025 through reforestation and afforestation.

Urban Forestry (Primary Goal): Plant and maintain enough trees in urban areas to offset 2008 metropolitan carbon emissions by 10% by 2025.

Urban Forestry (Secondary Goal): Increase the tree canopy coverage in all developed areas [population >500 residents per square mile] to 30% by 2025.

Timing: See above.

Parties Involved: Florida private forestland owners, DOF, FL Forestry Association, FWC, UF IFAS, NRCS, nongovernmental agencies, RPCs, other state land management agencies, USFS, US FWS, USACE, other federal land management and technical assistance agencies, the Nature Conservancy, forest industry, REITs, TIMOs, and private landowners, state government, and U.S. federal government.

Other: For urban forestry, the two goals overlap in terms of GHG benefits. Each will be quantified, and the goal with the largest benefit included in the summary table at the front of this document.

Intensifying reforestation and afforestation efforts in Florida's forests could increase the amount of greenhouse gas (GHG) reduction. According to 2006 data, approximately 152,000 acres are reforested annually in Florida by deliberate efforts, and an additional 34,000 acres are reforested

annually by naturally occurring forest self-regeneration. The total of 186,000 acres reforested and afforested annually represents 1.2% of all forestlands in Florida. Artificial reforestation (planting trees after final forest harvest) and afforestation (planting trees on agricultural and other lands) should be performed to establish adequate tree densities. Pine forests should be planted at a minimum of 605 or 726 trees per acre to assure adequate survival, tree growth, tree form and subsequent timber quality and quantity. Rapidly growing young pine trees sequester large quantities of CO_2; while stands that are not adequately stocked provide only a fraction of potential GHG reduction and woody biomass production for renewable energy production and other uses.

Establish a baseline for urban forest carbon storage and sequestration rates in Florida's top 10 metropolitan areas (based on population). By quantifying carbon storage and sequestration rates in these areas, it will be possible to establish appropriate long term goals to determine number of trees required to offset carbon emissions and reduce energy consumption in urban areas. Currently in Tampa, the urban forest only offsets approximately 1% of carbon emissions associated with human activity. A goal should be set that for urban forests to offset carbon emissions at the 2008 population levels by 10% by 2025.

Increased tree canopy coverage can be accomplished by a combination of tree planting projects, delineating natural areas in new developments, preservation of suitable specimen and groups of specimen trees on parcels during development, and adequate care of existing trees in developed areas.

Need to be sensitive to greenbelt taxing issues.

Implementation Mechanisms

Landowner assistance and/or incentive programs are needed to encourage reforestation and afforestation in Florida.

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Related Policies/Programs in Place

The Natural Resources Conservation Service's Farm Bill programs (CRP, GRP, WHIP, EQIP) support reforestation.

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The U.S. Fish and Wildlife Service's Partners for Fish and Wildlife supports reforestation of high priority habitats.

The Fish and Wildlife Commission's Landowner Assistance Program provides habitat management recommendations aimed at forming long-term partnerships with private landowners that lead to the restoration and conservation of high priority habitats, identified in Florida's Wildlife Action Plan http://myfwc.com/wildlifelegacy/. Recommendations include restoring native groundcover, overstory species, planting new pine stands at low densities, and thinning existing stands to benefit carbon sequestration, wildlife habitats, and forest health.

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The Urban and Community Forestry Program in DACS helps promote urban forestry and provides grants. City Green and I-Tree are programs that cities and communities can use to measure urban trees.

DOF is working with family and individual forest landowners, who control 5 million acres (30%) of Florida's forest lands, to advocate forest management aimed at well stocked forests for the duration of a rotation from tree planting to final harvest. Well stocked forests have a basal area of 60 to 80 sq ft per acre. When forests reach a merchantable basal area of approximately 100 to 150 sq ft per acre, they are thinned back to the 60 to 80 sq ft range to sustain optimal tree growth and forest health. After final harvest, pine forests should be replanted at a minimum of 605 or 726 trees per acre to assure adequate survival, tree growth, tree form, and subsequently timber quality and quantity. Planting at the recommended densities provides an opportunity for thinning in the middle of a 25 to 30 year rotation making wood available for energy production or traditional forest products. More trees at planting and adequate forest stocking means more CO_2 sequestered by rapidly growing young trees and more opportunities for woody biomass harvest for energy production and other uses.

Types(s) of GHG Reductions

Additional sequestered CO2 by rapidly growing trees on afforested/reforested acres representing 1.3% of forestland, which is above and beyond "business as usual" represented by 1.2% of reforestation/afforestation in 2006, for a grand total of 2.5% of new forestland.

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]

Notes on quantification of Urban Forestry element:

From Professor Michael Andreu:

A definition of 2008 metropolitan carbon emissions the burning of fossil fuels occurs from human activity associated with the primarily in the generation and consumption of electricity & transportation fuel consumption.

Do we know what the 2008 metropolitan carbon emissions number is? They also wanted quantification of the 10% reduction. Do we have data to support this? Is this a reasonable, achievable goal?

Well what I found for Florida was the following….. and put into my report to Tampa.

The UFORE model estimates that the amount of carbon sequestered or removed from the atmosphere in 2007 was 46,525 tons with an associated value of $945,396. The total net carbon sequestered annually by Tampa's urban forest is about 40,955 tons. Net carbon sequestration is the amount of carbon sequestered *less* the estimated amount of carbon emitted as dead trees decay. In Tampa carbon is sequestered and emitted by forests and humans daily. Ideally the forest would be considered a carbon sink or emit less than it stores, and this is the case for the urban forest of Tampa. While the urban forest of Tampa is a carbon sink (stores more carbon than it emits) it is not able to offset all of the additional carbon emissions produced by the activities of the human population in the city. If we assume that the population in Tampa is approximately 332,888 (City-data.com 2008) and the average emission per capita in Tampa is similar to the average of all Floridians at 15.26 tons/yr (www.eredux.org 2008) then the urban

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forest only reduces citywide carbon emissions by approximately 1% per year. To put this into perspective the urban trees annually sequester the amount of carbon emitted in 3.6 days by the population of Tampa.

So for one city in Florida (Tampa) using the above stated assumptions, the urban forest offsets 1% of carbon emissions from human activity. We don't know what other cities are doing at this time….which is why I suggested that a baseline for the top 10 metropolitan areas should be established so that we can base our goal standards on facts.

A quantification of 10% reduction….what do they mean….for the Kyoto protocol they pick 1990 as the baseline by which all carbon emission standards would be set….
"The Kyoto Protocol is an agreement under which industrialized countries will reduce their collective emissions of greenhouse gases by 5.2% compared to the year 1990 (but note that, compared to the emissions levels that would be expected by 2010 without the Protocol, this limitation represents a 29% cut). The goal is to lower overall emissions of six greenhouse gases - carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, hydrofluorocarbons, and perfluorocarbons - averaged over the period of 2008-2012." From wikipedia….

The 10% number may be difficult to achieve but I can't say without some real analysis, if I had a little time and money to analyze my data we could develop a set scenarios to determine what it would take in terms of increasing the number of trees to offset carbon emissions by 1%, 2%, 5%, 10% or X% for Tampa, this would be in terms of direct carbon sequestration and indirectly by shading buildings to reduce energy consumption. We have the ability to do this…..just not by the conference call next week.

Ok let's look at it another way…. Again referring to the Tampa study. Tampa currently has ~7.8 million trees of various sizes and species and it is able to offset 1% of the carbon emissions associated with human activity (using the assumptions I stated). So if that is the case then to get 2% of those emissions it would take an addition 7.8 million trees of comparable sizes and species. So then you must ask yourself is it realistic to suggest that the urban forest of Tampa will double in size in the near future?
Seems unlikely to me.

But then you can ask, is the current forest structure and composition optimized to sequester and store carbon….seems unlikely to me.

So could one design an urban forest that could sequester carbon at higher rates with fewer trees….in theory yes one could. Could one have it sequester 10% of the emissions….I honestly don't know that seems like a big number to me…..so as I said, I just pulled 10% out of the air, it could easily have been 2% or status quo 1%. The goal should be what do we want to see happen. How does this fit into the larger picture (what are other sectors going to remove)? We can set the bar low and say all city urban forests should be doing at least as well as Tampa so must meet 1% levels at some point in time (1990, 2000, 2008???), or the bar could be set higher assuming 1% is barely adequate and that it should be 2%...that too would be fine. But is that achievable and is it helpful…we don't know maybe Tampa is the best city in the state and to get to 1% would be difficult for other cities, maybe Tampa is one of the worst and 2% is quite common already so we would be undershooting and perhaps even going backwards, again we don't know. The only way we would know is to have some kind of information estimates summarizing the entire state……which does not to my knowledge exist.

As I said 10% was just a number pulled out of the air, the point was that by it would be better to focus on the amount of carbon desired to be offset. So if you want a readily justifiable number use 1%. If Tampa is capable of doing it so should everyone else and if they can't well then they have to purchase carbon credits to meet the goals….think about what kind of incentives that would create.

Michael G. Andreu, Ph.D., R.F.
Asst. Professor - Forest Systems & Extension Specialist
School of Forest Resources and Conservation
University of Florida - GCREC

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Key Assumptions: [TBD, as needed on TWG approval]

Key Uncertainties

TBD—[as needed and approved by the TWG]

Additional Benefits and Costs

TBD—[as needed and approved by the TWG]

TWG Suggestion:

Feasibility Issues

TBD—[as needed and approved by the TWG]

Status of Group Approval

Pending.

Level of Group Support

TBD—[blank until Action Team meeting #5]

Barriers to Consensus

TBD—[blank until final vote by the Florida Action Team]

AFW-3. Forest Management for Carbon Sequestration

Policy Description

Encourage management activities that promote forest productivity and increase the amount of carbon sequestered in forest biomass, soils, and in long-lived wood products. Practices may include thinning and density management, prescribed burning and risk reduction, and management of insects and disease. Reduce the severity of wildfires to reduce GHG emissions by lowering the forest carbon lost during a fire and by maintaining carbon sequestration potential. Similarly, reducing damage from insects, disease, and invasive plants reduces GHG emissions by maintaining the carbon sequestration potential of healthy forests.

Note that this policy has overlap with AFW-1: Forest Retention—Reduced Conversion of Forested to Non-Forested Land Uses and AFW-2 Afforestation and Restoration of Non-Forested Lands.

Policy Design

Goals:

Practice improved forest management for carbon sequestration to achieve an increase of at least 10% in productivity for the state's forestry plantations by 2025.

Nonfederal publicly managed forested lands will increase their carbon sequestration potential by X% by 2025.

Comment [smr3]: Action was o.k. with the TWG coming back with a recommended goal after some initial quantification.

Timing:

Parties Involved:

Other: The level of carbon sequestration potential in the second goal covering publicly-managed forests will be determined based on further discussion within the TWG after some initial analysis has occurred on the potential for GHG benefits on these lands.

Implementation Mechanisms

TBD

Related Policies/Programs in Place

For silviculture, BMPs developed by DACS, DEP, and IFAS related to water quality protection and water conservation. Note: Florida currently has very high compliance with BMPs.

The Fish and Wildlife Commission's Landowner Assistance Program provides wildlife-related habitat management recommendations towards long-term partnerships with private landowners that lead to the restoration and conservation of high priority habitats, identified in Florida's Wildlife Action Plan http://myfwc.com/wildlifelegacy/. Recommendations include restoring

native groundcover, overstory species, planting new pine stands at low densities, and thinning existing stands to benefit carbon sequestration, wildlife habitats, and forest health.

TBD Types(s) of GHG Reductions

TBD

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 TWG]

Additional Benefits and Costs

TBD—[as needed and approved by the TWG]

TWG Suggestion:

Feasibility Issues

TBD—[as needed and approved by the TWG]

Status of Group Approval

Pending.

Level of Group Support

TBD—[blank until Action Team meeting #5]

Barriers to Consensus

TBD—[blank until final vote by the Florida Action Team]

AFW-4. Expanded Use of Agriculture, Forestry, and Waste Management (AFW) Biomass Feedstocks for Electricity, Heat, and Steam Production

Policy Description

Increase the amount of biomass available from agriculture, forestry, and municipal solid waste (MSW) for generating electricity and displacing the use of fossil energy sources. Local electricity or steam production yields the greatest net energy payoff. This biomass should be used in an environmentally acceptable manner, considering proper facility siting and feedstock use (e.g., proximity of users to biomass, impact on water supply and quality, control of air emissions, solid waste management, cropping management, nutrient management, soil and non-soil carbon management, and impact on biodiversity and wildlife habitat). The objective is to create concurrent reduction of CO_2 due to displacement of fossil fuel, considering life cycle GHG emissions associated with viable collection, hauling, energy conversion, and energy distribution systems.

Issue long-term sustainable supply of reasonable cost biomass for generating electricity, heat, and steam. Promote enhanced growth of long rotation, short rotation and dedicated energy crops, as well as collection of biomass residues.

Provide incentives that will result in an increase in the use of waste-to-energy (WTE) and other waste-based energy technologies, and the recovery of landfill methane (CH_4) gas. These technologies make a two-fold contribution to climate protection: the discharge of CH_4 and other GHG into the atmosphere is reduced, and the burning of fossil fuels is replaced with recovered energy.

Note that this option is linked to options ESD-3 and ESD-5a which will have biomass demand requirements.

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Policy Design

Goals:

Primary: Increase the use ~~current generation~~ of renewable energy from biomass feedstocks by 500% by 2025.

Comment [RSA4]: The Action Team would like specificity on the types of biomass/crops that will be used to meet this goal; some of this is laid out in the secondary goal below, however the TWG should add additional detail during the next phase.

Comment [smr5]: DEP is working up estimates of current biomass usage for electricity generation and in RCI. CCS will pull information from the I&F to develop an initial estimate of biomass needs.

Secondary: By 2025 sugar cane, sweet sorghum, and other potential energy crops should increase by 10%. The acres of land producing ecologically sustainable energy crops are to increase up to an additional 300,000 acres by 2025, increase the current generation of renewable energy from WTE facilities by 20% by 2025, and increase the number of uncontrolled MSW landfills recovering CH_4 as an energy source, such that 50% of the landfill gas generated is controlled by 2020.

Timing:

Parties Involved: Municipal and county governments, private solid waste management companies, local economic development agencies, Florida Department Environmental Protection

(DEP), the Florida Energy Commission (FEC), nongovernmental organizations, public interest groups, Public Service Commission (PSC), private and public landowners, electrical utilities, DOF, Florida Department of Agriculture and Consumer Services (FDACS), and water management districts.

Other: Out of approximately 200 open and closed landfills in the state, only about 13 sites are currently recovering landfill CH_4 for energy use. Currently 11 WTE plants are operating in Florida, generating 513 megawatts (MW) of electricity.

Overall, policies need to decrease the risk and uncertainties associated with having sustainable supplies of good quality biomass at reasonable costs for the planned lifetime of the electrical, heat, or steam producing facility. It is likely a wide array of policies will be needed that influence land and conversion facility owners to dedicate themselves to using biomass feedstocks to produce renewable power.

Note the strong linkage to the energy supply sector, since WTE plants are active in the state. Also may consider new technologies, such as plasma arc.

Consider the following feedstock sources:

- *Long-Rotation Forests*—Need to promote the use of wood for electricity, steam, and heat in Florida by providing subsidies, tax credits, or payment schemes that enable landowners to conduct proper thinning and removals that benefit the health of the forest and decrease the chances of catastrophic wild fire. Promote the development of biomass utilizing faculties in appropriate locations that contain sufficient biomass, but do not already contain commercial conversion facilities, by providing infrastructure needed to support the development and transport of woody biomass. Promote development and deployment of advanced forest management practices (e.g., faster growing genetic stock with improved wood properties for conversion to electricity, steam and heat) that sustainably increases yields of biomass across the rotation.
- *Short-Rotation Forests*—Need to promote the development and commercial deployment of select and dedicated-forest tree species in Florida by providing the following possibilities: (1) establish guarantees or give subsidies for converting land near enough to facilities to short rotation forests, offering low cost loans to first time growers (i.e., overcome initial lack of cash flow); (2) landowner technical assistance programs; (3) promote stable and efficient markets for wood and residues from short rotation forests by creation of incentives for producing electricity, steam, and heat from this source of biomass; (4) create opportunities for conversion facility owners to partner with existing landowners to establish long-term supply agreements; and (5) development equipment and methods that can efficiently harvest and transport stems and residues to facilities that produce electricity, steam, and heat.
- *Other Energy Crops*
- *MSW Biomass*
- *Agriculture and Forestry Residues*—Promote the use of forest residues by developing the technical means and improving the financial returns that make use of these residues

commercially viable. Possibilities include: promoting research into harvesting, collection and compaction for transportation, and subsidies to promote their use at conversion facilities.

Implementation Mechanisms

TBD

Related Policies/Programs in Place

Executive Order (EO) 07-127 includes a request to the Public Service Commission (PSC) to establish a renewable portfolio standard (RPS) that would require utilities to obtain 20% of generation from renewable sources. Presumably this would create demand for biomass feedstocks.

Florida Division of Forestry promotes the development of woody biomass.

Existing statutory prohibitions promote the separate collection of yard waste biomass.

Types(s) of GHG Reductions

TBD

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 TWG]

Additional Benefits and Costs

TBD—[as needed and approved by the TWG]

TWG Suggestion:

Feasibility Issues

TBD—[as needed and approved by the TWG]

Status of Group Approval

Pending.

Level of Group Support

TBD—[blank until Action Team meeting #5]

Barriers to Consensus

TBD—[blank until final vote by the Florida Action Team]

AFW-5. Promotion of Farming Practices That Achieve GHG Benefits

Policy Description

The amount of carbon stored in the soil can be increased by the adoption of practices, such as conservation, no-till cultivation, and crop rotation. Provide incentives to farmers for using production practices that achieve net GHG benefits, such as no-till cultivation or biotechnology crops requiring reduced chemical or fuel use. Other benefits include reduced wind and water erosion, reduced fuel consumption, and improved wildlife habitat.

Convert marginal agricultural land used for annual crops to permanent cover (e.g., such as grassland/rangeland, grove, or forest) where the soil carbon or carbon in biomass is higher under the new land use. Provide incentives to producers to prevent grassland from returning either to conventionally tilled production or to suburban/urban development.

Improve the efficiency of fertilizer use and other nitrogen-based soil amendments through implementation of FDACS Best Management Practices (BMPs) manuals and support of biotechnology crops. Excess nitrogen not metabolized by plants can leach into groundwater and be emitted to the atmosphere as nitrous oxide (N_2O). Better nutrient utilization can lead to lower N_2O emissions from runoff.

This options has potential linkages with the Cap and Trade Technical Working Group (provision of carbon offsets).

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Policy Design

Goals:

Soil Carbon Management—By 2025, implement cultivation practices to enhance soil carbon levels on 40% of the acreage not already using these practices.

Agriculture Land Conversion—By 2025, convert XX acres of marginal agricultural land to higher sequestration permanent cover.

Comment [smr6]: TWG needs information on current estimates of marginal agricultural land to help inform this goal level.

Nutrient Management—Increase efficiency of fertilizer use by 25% in 2025, compared with business as usual (BAU).

Improved Harvesting Methods—Increase efficiency of energy use in harvesting by XX% by 2025.

Comment [smr7]: TWG needs information on higher efficiency harvesting methods applicable to FL crops.

Timing: See above.

Parties Involved: UF IFAS, Florida Farm Bureau (FFB), all commodity groups, FDACS, USDA-NRCS, and DEP.

Other: Numeric goals for agricultural land conversion and harvesting to be set after initial analysis of reduction potentials for these goals.

Voluntary, incentive-based programs are preferred over command and control regulation.

Also water quality/quantity, economics and other environmental benefits need to be taken into consideration when adopting certain practices.

Research, extension, technology, and biotechnology must be embraced for increased yields and improved harvesting techniques.

Implementation Mechanisms

TBD

Comment [smr8]: TWG needs to provide link over to Cap and Trade options and how this option relates.

Related Policies/Programs in Place

TBD

Types(s) of GHG Reductions

TBD

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 TWG]

Additional Benefits and Costs

TBD—[as needed and approved by the TWG]

TWG Suggestion:

Feasibility Issues

TBD—[as needed and approved by the TWG]

Status of Group Approval

Pending.

Level of Group Support

TBD—[blank until Action Team meeting #5]

Barriers to Consensus

TBD—[blank until final vote by the Florida Action Team]

AFW-6. Reduce the Rate of Agricultural Land and Open Green Space Conversion tTo Development

Policy Description

Reduce the rate at which agricultural lands and open green space 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 their carbon sequestration potential. Transportation emissions will be reduced indirectly through more efficient development and lower vehicle use. Agricultural land and open green space conversion may be prevented through fee title acquisitions or conservation easements.

Policy Design

Goals: ~~Reduce the rate at which agricultural lands and open green spaces are converted to development by protecting one acre of agricultural land or open green space for each acre lost to development:~~ By 2025, achieve a 50% reduction in the level of losses that would have otherwise occurred.

Timing: Achieve the goal throughout the policy period.

Parties Involved: FDACS; USDA, DEP, FWC, DCA; water management districts, and nongovernmental organizations.

Other: Existing and estimated future agricultural and forested land loss is shown in the following FDCAS presentation: http://www.dca.state.fl.us/fdcp/dcp/gmw/2008/Scott.pdf

Implementation Mechanisms

TBD

Related Policies/Programs in Place

TBD

Types(s) of GHG Reductions

TBD

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]

Comment [RSA9]: The Action Team asked where these protected lands will be located?

Comment [smr10]: Action Team wanted to see approaches for keeping working lands as working lands (concern that there won't be enough funding to buy or provide conservation easements on all acres). The text on a "1 acre saved per 1 acre converted" could be used in some way under Implementation Mechanisms.

Comment [smr11]: Consider developing approaches where carbon impacts need to be considered as part of the planning process in land use development.

Comment [smr12]: Charles Pattison of the Action Team mentioned a UF GIS study on conversion by 2050 that could have useful information. Not sure if this is the same UF 2060 study that has been distributed to the TWG (CCS to follow-up).

Key Assumptions: [TBD, as needed on TWG approval]

Key Uncertainties

TBD—[as needed and approved by the TWG]

Additional Benefits and Costs

TBD—[as needed and approved by the TWG]

TWG Suggestion:

Feasibility Issues

TBD—[as needed and approved by the TWG]

Status of Group Approval

Pending.

Level of Group Support

TBD—[blank until Action Team meeting #5]

Barriers to Consensus

TBD—[blank until final vote by the Florida Action Team]

AFW-7. In-State Liquid/Gaseous Biofuels Production

Policy Description

Increase production of ethanol, bio-diesel, and transportation fuel (compressed natural gas) from agriculture, forestry feedstocks or MSW and other waste (raw materials) to displace the use of fossil fuel. Promote the development of technologies and production systems that use MSW biomass to produce liquid or gaseous biofuels, and the use of biomass in conjunction with other resources to produce ethanol. Bio-diesel and compressed natural gas use will offset fuel derived from petroleum and will lead to decreased fossil fuel-based CO_2 emissions. Provide market incentives to develop biofuels technologies from the multiple feedstocks.

Note that this option is linked to the TLU Low Carbon Fuel Standards option. The focus of this option is on in-state production of biofuels

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Policy Design

Goals:

Primary: Maximize the production of liquid and gaseous biofuels in Florida, such that by 2025 the state utilizes 20% of available biomass supply per year to produce biofuels with significantly lower embedded GHG emissions compared with conventional fuel products.

Secondary: Produce enough in-state biofuel to offset 25% of Florida's consumption of liquid fuels that are fossil fuel-based by 2025, using GHG-superior feedstocks. Replace 2% of petro-diesel with biofuel by 2012 and 10% of gasoline with ethanol by 2010.

Timing: See above.

Parties Involved: Municipal and county governments, private solid waste management companies, local economic development agencies, Florida Department of Environmental Protection, Florida Energy Commission, nongovernmental organizations, public interest groups, and Public Service Commission.

Other: Primary and secondary goals are to be achieved. However, some revision to either goal might be needed after some initial analysis of feedstock availability and the quantities of biofuels necessary to offset forecast consumption.

Consider the following feedstock sources:

- *Long-Rotation Forests*—Need to promote the use of wood for liquid biofuels in Florida by providing subsidies, tax credits, or payment schemes that enable landowners to conduct proper thinning and removals that benefit the health of the forest and decrease the chances of catastrophic wild fire. Promote the development of biomass utilizing facilities in appropriate locations that contain sufficient biomass, but don't already contain commercial conversion facilities, by providing infrastructure needed to support the development and transport of woody biomass. Promote development and deployment of advanced forest management

practices (e.g., faster growing genetic stock with improved wood properties for conversion to electricity, steam, and heat) that sustainably increases yields of biomass across the rotation.

- *Short-Rotation Forests*—Need to promote the development and commercial deployment of select and dedicated-forest tree species in Florida by providing the following possibilities: (1) establish guarantees or give subsidies for converting land near enough to facilities to short rotation forests, offering low cost loans to first time growers (i.e., overcome initial lack of cash flow); (2) landowner technical assistance programs; (3) promote stable and efficient markets for wood and residues from short rotation forests by creation of incentives for producing electricity, steam, and heat from this source of biomass; (4) create opportunities for conversion facility owners to partner with existing landowners to establish long-term supply agreements; and (5) development equipment and methods that can efficiently harvest and transport stems and residues to facilities that produce liquid biofuels.
- *Other Energy Crops*—The state should not incur costs and impacts associated with invasive plant species by encouraging, permitting, or incentivizing use of these species for carbon feedstocks.
- *MSW Biomass*
- *Agriculture and Forestry Residues*—Promote the use of forest residues by developing the technical means and improving the financial returns that make use of these residues commercially viable. Possibilities include: promoting research into harvesting, collection and compaction for transportation, and subsidies to promote their use at conversion facilities.

Overall, policies need to decrease the risk and uncertainties associated with having sustainable supplies of good quality biomass at reasonable costs for the planned lifetime of the electrical, heat, or steam producing facility. It is likely a wide array of policies will be needed that influence land and conversion facility owners to dedicate themselves to using biomass feedstocks to produce renewable power.

Utilization of liquid and gaseous biofuel plants in close proximity to energy crops will cause reduction in the amount of energy required for transportation and fossil fuel use.

Combine technologies to enable ethanol production by utilizing cellulosic biomass extracted from solid waste streams, and agricultural and forestry crops and residues.

Implementation Mechanisms

TBD

Provide grants or incentives to develop small-scale biorefinery projects to convert woody wastes to cellulosic ethanol or other fuels.

Provide grants or incentives to develop Florida-based projects to convert landfill gas to liquefied natural gas.

Pilot new technologies to process organic wastes from agriculture wastes and manure, food and yard wastes, and industrial sludges to produce renewable fuels.

Comment [smr13]: TWG needs to develop implementation issues focused on feedstock and production methods; however we also need to assure that the TLU LCFS Option addresses the important demand-side issues, including distribution.

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Related Policies/Programs in Place

TBD

Types(s) of GHG Reductions

TBD

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 TWG]

Additional Benefits and Costs

TBD—[as needed and approved by the TWG]

TWG Suggestion:

Feasibility Issues

TBD—[as needed and approved by the TWG]

Status of Group Approval

Pending.

Level of Group Support

TBD—[blank until Action Team meeting #5]

Barriers to Consensus

TBD—[blank until final vote by the Action Team]

Comment [smr14]: Need to run our assumptions of cellulosic ETOH production per dry ton by Dr. Ingram (UF) of the Action Team. His comments indicated that important biomass feedstocks in FL (southern pine) currently have lower yields than other feedstocks (on the order of 60-90 gal/dry ton).

AFW-8. Promotion of Advanced Municipal Solid Waste (MSW) Management Technologies (Including Bioreactor Technology)

Policy Description

Promote the development and implementation of solid waste management technologies and practices that minimize or reduce GHG emissions. These technologies include those that improve fuel efficiency in the collection, transport, and disposal of solid waste, including procurement of more fuel-efficient vehicles, to reduce the consumption of fossil fuels and related CO_2 emissions. Waste management technologies are needed that will enhance landfill gas collection and production, such as bioreactor technology, to accelerate landfill gas production and waste stabilization.

There is some level of overlap between this option and the MSW landfill gas goal under AFW-4.

Policy Design

Goals: Decrease GHG emissions from cradle-to-grave solid waste management practices by 25% (collection, transportation and disposal) from BAU by 2025.

Comment [smr15]: CCS will need to get assistance from TWG members who have access to data summarizing typical energy consumption for collection/transportation of MSW.

Timing: See above.

Parties Involved: Local governments conducting solid waste collection and disposal, private solid waste management companies, vehicle and equipment suppliers, fuel suppliers, state regulatory agencies (DEP, PSC), federal agencies (US EPA), regulated electrical utilities, public interest groups, and the public-at-large (rate-paying public).

Other: A substantial component of the carbon footprint of solid waste management is the fuel consumed in collecting and transporting waste. Because the amounts of fuel consumed are significant from an economic standpoint, many public and private sector operations are already trying to maximize their efficiency. Nevertheless, there may be opportunities to seek further improvement, and because of the magnitude, even small improvements will yield substantial reductions. Software providing modern computer-aided routing may not be available to all entities collecting waste, particularly local governments collecting waste with their own forces. Creating a mechanism to assist those entities that do not have, and perhaps cannot afford, routing software may yield benefits.

The fleets of solid waste collection vehicles are managed to maximize their operating hours, and these vehicles may have a typical useful life of 7–10 years. As vehicle and equipment manufacturers develop more fuel-efficient stock, it may be helpful to examine a program to incentivize early replacement of vehicles with more fuel-efficient models. An opportunity may arise to do a life cycle and carbon footprint analysis of tax incentives for replacing older collection vehicles with newer more efficient ones.

Smaller landfills, and landfills that closed prior to the regulatory requirements that mandated the installation of collection systems for landfill gas, may still be creating impacts on GHG levels

through the uncontrolled release of landfill gas. The collection and management of this landfill gas will be an environmental benefit, even if the quantities collected are not sufficient to support a viable landfill gas to energy project. A combination of incentives that produce GHG-reduction credits for collecting and managing the gas at sites that would otherwise be exempt, together with a review to determine if additional regulation is required, can quantify the costs and benefits of collecting gas at these types of facilities.

A bioreactor landfill is essentially an in-landfill activity conducted at a standard Subtitle D sanitary landfill in which liquid, temperature, and air and landfill gas collection are managed in a controlled manner to achieve a more rapid stabilization of the biogenic waste constituents (food, greenwaste, and paper). A bioreactor landfill will produce more landfill gas over a shorter period of time than a standard Subtitle D landfill. This may make the economic viability of landfill gas to energy projects more attractive. To optimize the rapid waste stabilization of these wastes, moisture, gas composition, gas flow, and temperature must be carefully maintained and monitored.

Whether a landfill is managed as a standard Subtitle D landfill, or as a bioreactor, the efficiency of landfill gas collection should be maximize to limit release of CH_4 to the atmosphere. This would include installing collection systems for landfill gas earlier than the time frames required in current regulations, which stipulate installation after waste has been in place for 5 years. Economic factors that make the production of energy from landfill gas attractive may be as important in encouraging the maximum efficiency of collection systems as regulatory requirements.

Implementation Mechanisms

Promote the use of enhanced routing analysis techniques to reduce the amount of fuel consumed during waste collection and transport.

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Encourage the accelerated replacement of collection and transport vehicles with more fuel efficient vehicles.

Deploy enhanced landfill gas collection systems, including bioreactor technology, where appropriate, to accelerate production of landfill gas generation and efficiency of collection at 50% of new or currently operating landfills by 2025.

Install landfill gas collection systems at uncontrolled landfills and/or closed municipal solid waste landfills, to reduce the amount of uncontrolled release of methane from these facilities by 50% by 2020.

The proposed cap and trade system for Greenhouse Gas emission will create incentives for more efficient collection and utilization of landfill gas.
The establishment of Renewable Energy Credits (RECs) for the generation of electricity from landfill gas, combined with a Renewable Portfolio Standard will add more value to the power generated by landfill gas and make more projects economically viable.

Tax incentives for the replacement of older vehicles with newer more fuel efficient ones could be developed based on life cycle benefits and carbon footprint impacts.

Related Policies/Programs in Place

Existing regulations require the collection of landfill gas, testing the efficiency of collection systems, and reporting quantities of gas collected to DEP. It may take some modification to existing Subtitle D landfill regulations to effectively implement bioreactor technology.

Existing regulatory programs for small and closed landfills may help identify sites that have potential for reducing GHG emissions by installing landfill gas collection systems.

DEP and the UF Hinkley Center for Solid and Hazardous Waste Management are currently funding three bioreactor demonstration projects in Florida (see www.bioreactor.org).

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Types(s) of GHG Reductions

TBD

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 TWG]

Additional Benefits and Costs

TBD—[as needed and approved by the TWG]

TWG Suggestion:

Feasibility Issues

TBD—[as needed and approved by the TWG]

Status of Group Approval

Pending.

Level of Group Support

TBD—[blank until Action Team meeting #5]

Barriers to Consensus

TBD—[blank until final vote by the Action Team]

AFW-9. Improved Commercialization of Biomass to Energy Conversion and Bio-Products Technologies

Policy Description

Improved commercialization of biomass to energy conversion and bio-products technologies:

- Manure digestion/other waste energy utilization,
- Wastewater treatment plant (WWTP) biosolids energy production,
- Other biomass conversion technologies, and
- Bio-products technologies and use.

The CH_4 emissions inherent from the anaerobic decomposition process of manure and other wastes may be captured and used as an energy source. In so doing, it is possible to both reduce CH_4 emissions and to offset fossil-based energy. However, the cost of emission capture and energy production may be higher than the value of the energy collected, making this option cost prohibitive for producers operating in a tight margin business. This option covers programs to increase the number of CH_4 capture and energy recovery projects using manure or other waste. CH_4 digesters could be on-farm or a regional-type digester could be employed.

Develop and implement methods for WWTP biosolids processing and use as a renewable energy and nutrient source, including but not limited to, co-firing with other fuels in existing or new combustion units for the purpose of generating electricity, heat, or steam, and application of WWTP biosolids to agricultural soils.

Improve the rate of technology development and market deployment of biomass and MSW conversion technologies, including biomass gasification combined cycle (BGCC) electricity generation, pyrolysis, and plasma arc technologies.

Increase the amount of renewable products and chemicals produced and used (including building materials that reduce GHG emissions) over conventional petroleum-based products. Promote the use of crop residues and MSW as a source of material for reuse (e.g., in building materials, packaging, or other materials).

Policy Design

Goals:

Utilize 20% of available CH_4 from livestock manure for energy production by 2025.

Utilize 50% of available WWTP solids for energy production or soil application by 2025.

Utilize 50% of available biomass and MSW as energy sources (after accounting for biomass needs under AFW-4 and AFW-7) by 2025.

Annually p~~P~~roduce and utilize 150,000 tons of bio-based products by 2025.

Comment [smr16]: Action Team questioned whether this goal was too low; requested the TWG to look at 50%, as well as 20%. Costs could potentially be much different depending on the distribution of herd size of FL CAFOs.

Comment [smr17]: Some Action Team members expressed discomfort with soil application of biosolids; TWG will need to provide some safeguards under implementation to alleviate potential problems related to application in the wrong areas.

Comment [smr18]: CCS requests input from the TWG on potential bio-products and feedstocks; the goal might be adjusted following quantification.

Develop emerging technologies, including BG~~B~~CC, pyrolysis and plasma arc, for more efficiency by 2025.

Comment [smr19]: In order to quantify this goal, CCS needs input from the TWG on a specific technology for analysis and the number of these plants to be constructed at pilot or commercial scales.

Timing: See above.

Parties Involved: Livestock producers, FFB, Sunbelt Milk Producers, Florida Cattlemen's Association (FCA), Florida Electric Cooperatives Association (FECA), UF IFAS, FDACS, DEP, and USDA-NRCS.

Other: It should be noted that CH_4 digesters are a proven technology, but Florida does present some specific challenges. Also any digester that would be constructed must ultimately be managed, which could cause an additional burden on livestock producers without the proper assistance.

A range of renewable products can be developed from these biomass conversion processes, including gaseous and liquid fuels, biochar, chemical products, and CH_4 to methanol. Existing processes include waste combustion and energy recovery (as electricity, steam, or both) or ethanol plants using co-products for heating and drying, rather than relying on outside energy sources.

Improve the utilization and development of bio-products for insulation and packaging material. Significant increase of bio-product technology is to be made available by 2017 for commercial, industrial and residential use.

Increased development of emerging technologies will ultimately increase commercialization of such technologies.

Implementation Mechanisms

TBD

Related Policies/Programs in Place

E.O. 07-127 RPS request may create additional demand for methane digesters; further recent rulemaking by the PSC would enable net-metering for up to 2 megawatts (MW) in capacity and standard interconnection for all distributed renewables, thus furthering the likelihood of this technology.

Types(s) of GHG Reductions

TBD

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 TWG]

Additional Benefits and Costs

TBD—[as needed and approved by the TWG]

Comment [smr20]: Action Team requested that the TWG address water quality benefits of this action here.

TWG Suggestion:

Feasibility Issues

TBD—[as needed and approved by the TWG]

Status of Group Approval

Pending.

Level of Group Support

TBD—[blank until Action Team meeting #5]

Barriers to Consensus

TBD—[blank until final vote by the Action Team]

AFW-10. Programs to Support Local Farming/Buy Local

Policy Description

Promote the production and consumption of locally produced agricultural goods, including transportation and heating fuel and plastics, which displace the consumption of those transported from other states or countries.

Comment [smr21]: TWG should include some mention here on what is currently happening in this area in FL, with more details under "Existing Policies/Programs in Place".

Policy Design

Goals: Encourage the production of locally produced agricultural goods by 2025. Additional research is needed by the TWG to identify an appropriate goal for this option. As described under "Other" below, Florida has ongoing programs in this area believed to successfully support in-state consumption of locally produced agricultural goods. Potentially, there are some opportunities to increase local consumption of Florida dairy and meat products. The TWG requests additional input from the Action Team on areas to target. As in most states, data on agricultural product imports into the state are lacking.

Comment [RSA22]: The Action Team voted to leave this as an unquantified option. There was a suggestion from the Action Team to include education of the public on locally produced food, as well as any other related items recommended by the TWG.

Timing:

Parties Involved:

Other:

The FDACS Division of Marketing and Development has promoted the production and consumption of locally grown or produced goods through the Florida Agricultural Promotional Campaign, and through support to local Community Farmers' Markets.

Over the last 8 years the Florida retail campaign has focused considerable resources to promote the Fresh from Florida agricultural products in local markets, including more than 1,250 retail outlets in Florida: Publix, Winn Dixie, Albertson's, Sweet Bay, Harvey's, and Sedano. Retailers strategically place local stores to serve customers normally within a 5–10 mile radius. This system is the best means of moving sufficient quantities of fresh product into an efficient distribution system already in existence.

The campaign supports the Community Farmers' Markets by providing a kit on "How to Organize, Operate and Market Farmers' Markets in Florida." This kit offers resources, including sample market rules, vendor applications, and a sample questionnaire for farmers. Marketing and management advice to these organizations are provided as requested. These farmers' markets are promoted through the maintenance of a directory and Web site. There is also a Web site being developed that list Community Supported Agriculture operations. The Farmers' Market Nutrition programs provide monetary support to these markets in the participating sixteen counties.

Implementation Mechanisms

TBD

Related Policies/Programs in Place

Florida Agricultural Promotional Campaign (FAPC) promotes local farming and agricultural products in Florida.

Types(s) of GHG Reductions

GHG reductions occur from reduced transportation-related emissions and reduced embedded energy.

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 TWG]

Additional Benefits and Costs

TBD—[as needed and approved by the TWG]

TWG Suggestion:

Feasibility Issues

TBD—[as needed and approved by the TWG]

Status of Group Approval

Pending.

Level of Group Support

TBD—[blank until Action Team meeting #5]

Barriers to Consensus

TBD—[blank until final vote]