Executive Summary

During the past 14 months, the Governor's Action Team on Energy and Climate Change (Action Team) worked diligently to develop the Florida Energy and Climate Change Action Plan (Action Plan). In keeping with the guidance provided in Executive Order 07-128 by Florida Governor Charlie Crist, the Action Team has developed this integrated Action Plan that will, through careful coordination, secure Florida's energy future, reduce greenhouse gas emissions, and heavily support and sustain strategic economic development in the emerging "green tech" sector.

The principal conclusions that have emerged from the Action Team process include:

- Based upon the findings of the 4th Assessment of the Intergovernmental Panel on Climate Change, Florida's resources, communities, and economy are expected to experience significant impacts if the current trajectory of global greenhouse gas emissions is not reversed;
- Early action to address global climate change has significant energy security benefits for Floridians, while positioning the state to become a regional and hemispheric hub of green technology innovation and investment;
- Energy efficiency, demand-side management, and energy conservation present Florida with numerous opportunities to reduce energy costs, increase the buying power of Florida's families, and make the state's business sector more cost-competitive in the global market;
- Investments today in low-carbon energy sources – renewables, nuclear power, and biofuels – will stimulate Florida's economy and redirect current expenditures on imported fossil fuels toward Florida-based energy sources retaining significant flows of money within local economies;
- Market-oriented regulations – many already authorized in Florida law – will efficiently guide a low-carbon economy while protecting energy consumers, maintaining Florida's agricultural competitiveness, and building more sustainable communities.

This Phase 2 report provides 50 separate policy recommendations, plus an additional set of comments toward the current regulatory work to develop Florida's cap-and-trade program to reduce harmful greenhouse gas emissions. These recommendations, if implemented, would result in greenhouse gas emission reductions that would surpass the Governor's 2017 and 2025 emission reduction targets by 11 percent and 34 percent, respectively. Additionally, while some of the recommendations result in an overall societal cost to implement, many were identified to have an overall societal cost-savings. The total net cost savings of all Action Team recommendations combined is more than $28 billion from 2009 to 2025. Additionally, the recommendations would increase Florida's energy security by reducing our dependence on fossil fuels resulting in a total fuel savings of 53.5 billion gallons of petroleum, 200.2 million

short tons of coal, and 6.394 billion cubic feet of natural gas during the period of 2009 through 2025.

The Action Team completes its charge during a time of economic uncertainty. While it may be assumed by some readers that the current economic environment would hamper Florida's progress toward a low-carbon economy, the Action Team firmly believes that current economic conditions precisely sharpen the "call to action" first issued by Governor Crist in 2007. Now is the time for strategic investment in Florida's low-carbon energy infrastructure if we are to be successful in diversifying the state's economy, creating new job opportunities, and positioning Florida's "green tech" sector as an economic engine for growth.

The analyses and recommendations provided in the Action Plan are based on current data and projections in the areas of science, demographics, energy consumption, and economics. As Florida moves forward in implementing this Action Plan, it is essential that the Florida Energy and Climate Commission continually update and review these analyses as additional data and information become available.

Background

On July 12 and 13, 2007, Governor Crist hosted "Serve to Preserve: A Florida Summit on Global Climate Change" in Miami. This unprecedented event gathered leaders of business, government, science, and advocacy to examine the unique risks of climate change to Florida and the nation, and to explore the economic development opportunities available through an aggressive response to climate change. At the conclusion of the summit, Governor Crist signed three Executive Orders and two partnership agreements (with Germany and Great Britain) to propel Florida to the forefront of states actively working to address global climate change. One of those orders, Executive Order 07-128 established the Governor's Action Team on Energy and Climate Change and tasked it with creating a comprehensive Florida Energy and Climate Change Action Plan to achieve or surpass the statewide targets for greenhouse gas reduction.

On November 1, 2007, the Action Team issued its Phase 1 report that recommended a range of policies to reduce greenhouse gas emissions and increase Florida's energy security. A number of key issues were referred to Phase 2 for further study and more detailed recommendations.

At the outset of 2008, the State of Florida had a number of energy and climate change initiatives under way. Many of these were in response to the three Executive Orders issued by Governor Crist in 2007. The Legislature passed three bills during the 2008 Regular Session that significantly impacted energy and climate change issues. The most notable is House Bill 7135 (HB 7135), which contains many provisions that are moving Florida aggressively forward in energy security and climate change mitigation. While some of the recently enacted policies and programs are in rulemaking, Florida can point to a significant number of early achievements in

state government greenhouse gas emissions reductions, private sector renewable energy projects, utility-based solar energy, energy efficiency, and related research and development.

The Action Team reconvened in February 2008 to begin Phase 2 of Executive Order 07-128 requirements. As identified in the Action Team's Phase 1 report, a facilitated, stakeholder-based, consensus-building process was developed for Phase 2. The Center for Climate Strategies facilitated and provided technical support for this phase of the process. As part of this effort, the Action Team designated six Technical Working Groups to focus on specific issues and sectors of the economy. The six Technical Working Groups were:

- Energy Supply and Demand;
- Transportation and Land Use;
- Agriculture, Forestry, and Waste Management;
- Government Policy and Coordination;
- Cap-and-Trade; and
- Adaptation.

The Action Team and the Technical Working Groups worked diligently in order to meet the October 2008 deadline for completion of this Phase 2 Report. The 28 Action Team members appointed by the Governor gathered a total of eight times in Phase 2 during 2008, representing more than 60 hours of deliberation as a full group. The 122 appointed members of the six Technical Working Groups met more than 71 times on toll-free, public access conference calls, representing more than 155 hours of combined meeting time.

The Action Team's recommendations in this Phase 2 Report build on Florida's accomplishments in 2007 and 2008 and point the way forward for 2009 and beyond.

Inventory of Florida's Greenhouse Gas Emissions

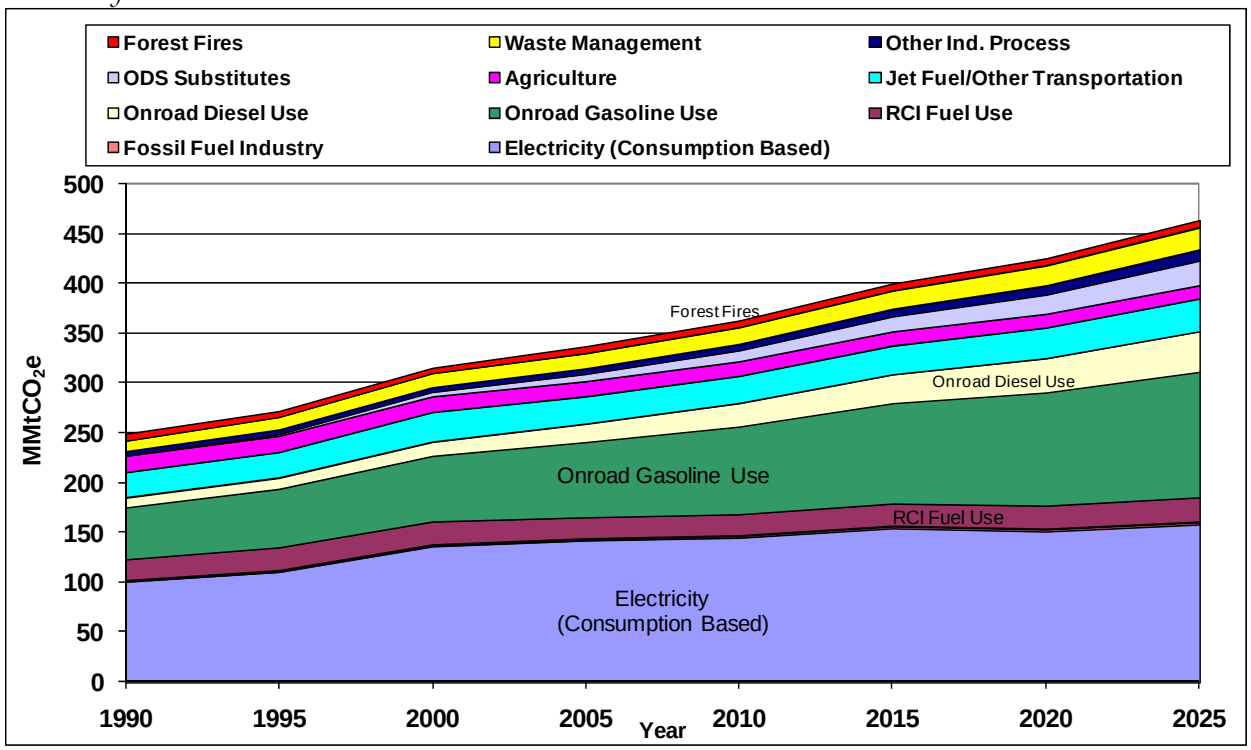
In 2005, Florida's gross emissions accounted for approximately 337 million metric tons of carbon dioxide equivalent. Florida's gross emissions of greenhouse gases grew by 35 percent between 1990 and 2005 (roughly twice the national average of 16 percent), driven largely by the growth of population and emissions associated with economic development. The state's emissions on a per capita basis remained relatively flat between 1990 and 2005, as compared to U.S. per capita emissions, which declined slightly (2 percent) during the same period. In the absence of recent developments that Florida has undertaken to control its emissions, gross greenhouse gas emissions are projected to rise steeply to about 463 million metric tons of carbon dioxide equivalent by 2025, or 86 percent more than 1990 levels.

Figure EX-1 depicts the historical and projected gross greenhouse gas emissions by key sectors, during the period from 1990 to 2025. The modeled gross emission levels are predicted using a

consumption-based approach and represent the business as usual, or base case scenario. Florida's 16.7 million acres of forests serve to capture and store greenhouse gas emissions (known as "carbon sinks"). On a net emissions basis (including carbon sinks), Florida accounted for approximately 309 million metric tons of carbon dioxide equivalent of emissions in 2005.

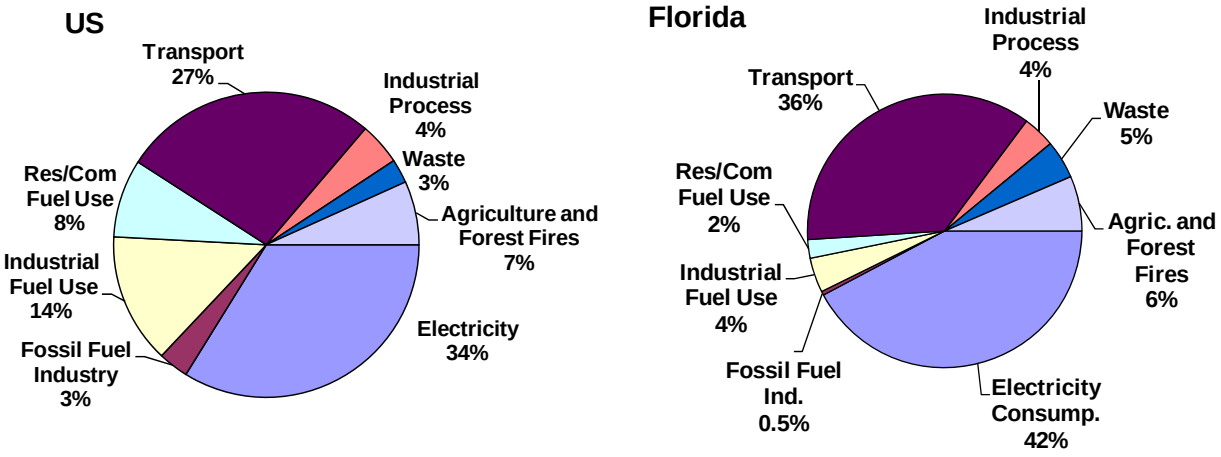
Figure EX-1. Gross greenhouse gas emissions by sector, 1990–2025: historical and projected (consumption-based approach) business as usual/base case

Colors on the graph are displayed left to right, top to bottom in the key, putting Forest Fires at the top and Electricity at the bottom.



RCI = direct fuel use in residential, commercial, and industrial sectors; ODS = ozone depleting substance.

Figure EX-2. Gross greenhouse gas emissions by sector, 2005: Florida and U.S.



The principal sources of Florida's greenhouse gas emissions in 2005 are electricity consumption and transportation, accounting for 42 percent and 36 percent of Florida's gross greenhouse gas emissions, respectively. Other sources of greenhouse gases include emissions from; agriculture and forest fires, waste management, industrial processes, industrial fuel use, residential fuel use, and the fossil fuel industry. Figure EX-2 depicts the 2005 gross greenhouse gas emissions by each of these sectors in Florida and the U.S.

Action Team Recommendations

The Action Team recommends 50 policy actions relating to: energy supply and demand; transportation and land use; agriculture, forestry, and waste management; government policy and coordination; and adaptation strategies associated with climate change. For 28 of these recommendations, the Center for Climate Strategies provided a specific analysis and quantification of the estimated reduction in greenhouse gases associated with each recommendation.

In addition, as part of the cap-and-trade discussion, the Action Team offers a suite of recommendations as guidance to the Florida Department of Environmental Protection as its cap-and-trade rulemaking occurs before submitting its market-based emissions limiting program to the Legislature for consideration and ratification in the 2010 Session (as required by HB 7135).

Table EX-1 shows the levels of emissions for selected years for the reference case, recent actions, target levels and the 28 Action Team recommendations that were quantified.

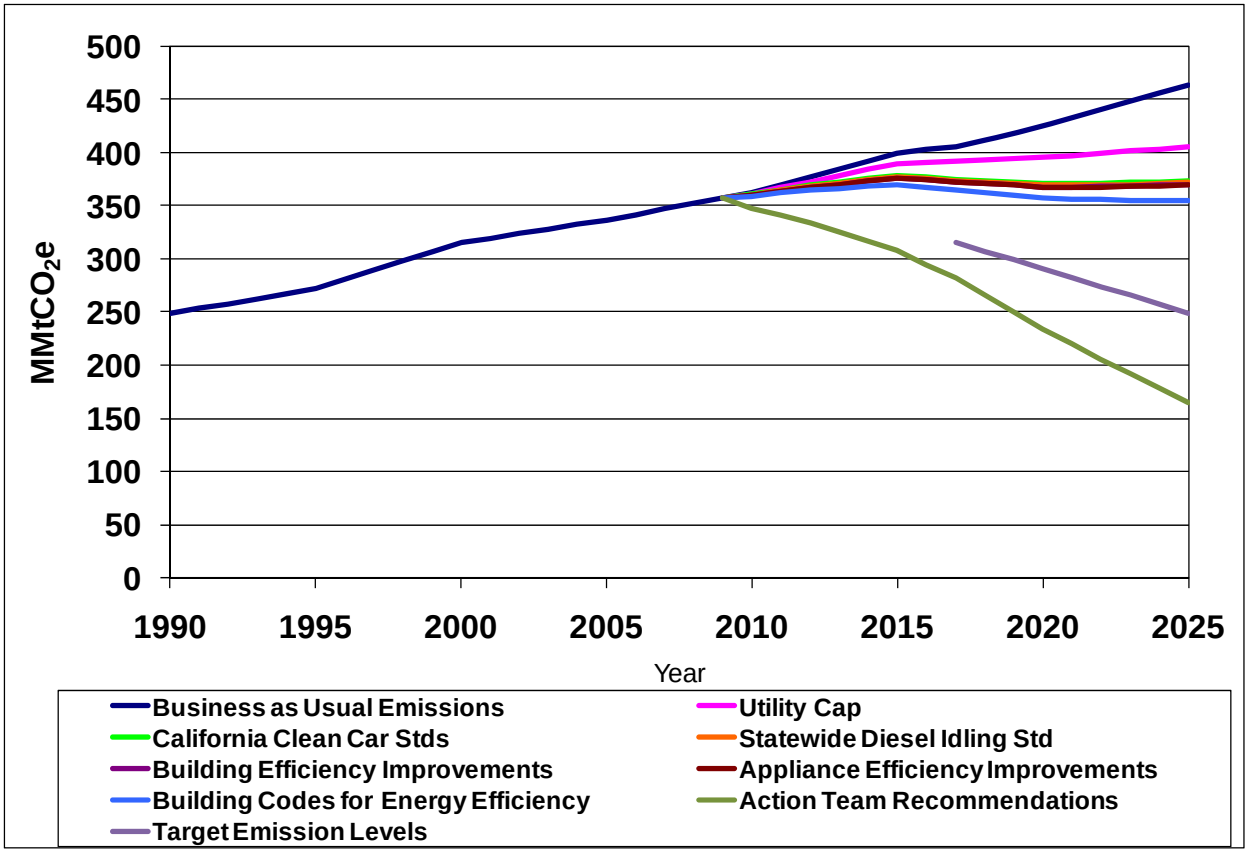
Table EX-1. Annual emissions: reference case projections and impact of Action Team recommendations (consumption-basis, gross emissions)

Annual Emissions ($MMtCO_2e$)	1990	2000	2005	2017	2025
Reference Case Projections	248.8	315.0	336.6	405.0	463.3
Reductions From Recent Actions (Executive Order 07-127)				40.6	108.7
Projected Greenhouse Gas Emissions After Recent Actions				364.4	354.6
Target Emission Levels				315.0	248.8
Total Greenhouse Gas Reductions From Action Team Recommendations				82.6	189.8
Difference Between Action Team Reductions and Target Emission Levels				-33.2	-84.0
Projected Annual Emissions After Quantified Action Team Reductions				281.8	164.8

$MMtCO_2e$ = million metric tons of carbon dioxide equivalent.

Figure EX-3 shows the total greenhouse gas emissions since 1990 and the reference case projection of emissions from 2005 through 2025 (dark blue line). Below this reference case is a family of lines that represent the contributions of each of the major recent and planned measures resulting from Executive Order 07-127, including improved building codes, utility cap, state clean car standards, and appliance efficiency standards. The impact of these actions is projected to be a 24 percent reduction from the reference case; and would result in a leveling of Florida's greenhouse gas emission growth. The green line represents the cumulative benefits of the Action Team's quantified policy recommendations. Assuming all recommended policies are adopted, in 2017 total emissions would drop to 281.8 million metric tons of carbon dioxide equivalent, or 30 percent below the reference case and 11 percent below the governor's 2017 target. In 2025, assuming all recommended policies are adopted, total emissions would drop to 164.8 million metric tons of carbon dioxide equivalent, more than 64 percent below the reference case and 34 percent below the Governor's 2025 emissions target.

Figure EX-3. Annual greenhouse gas emissions: reference case projections and Action Team recommendations (consumption-basis, gross emissions)



$MMtCO_2e$ = million metric tons of carbon dioxide equivalent.

Colors on the graph are displayed left to right, top to bottom in the key, putting Business as Usual Emissions at the top and Action Team Recommendations at the bottom.

Table EX-2 provides a summary by sector of the estimated cumulative impacts of implementing all of the Action Team's recommendations. Note that the cumulative impacts shown in Table EX-2 account for overlaps between policies by eliminating potential double counting of emission reductions and costs or cost savings and have been adjusted for other interactions between the recommended policy actions.

Table EX-2. Summary by sector of estimated impacts of implementing all of the Action Team recommendations (cumulative reductions and costs/savings)

Sector	Greenhouse Gas Reductions ($MMtCO_2e$)			Net Present Value 2009–2025 (Million $)	Cost-Effectiveness ($/tCO2e)
	2017	2025	Total 2009–2025		
Energy Supply	44.4	106	841	–$16,143	–$19
Transportation and Land Use	12.7	25.1	214	–$18,400	–$86
Agriculture, Forestry, and Waste Management	25.4	58.2	469	$5,974	$13
Government Policy and Coordination	*Non-quantified, enabling options*				
Adaptation Strategies	*Non-quantified*				
Cap-and-Trade	*Results not included in cross-sector totals*				
TOTAL (includes all adjustments for overlaps and recent actions)	**82.6**	**190**	**1,548**	**-$28,569**	**–$18**

$MMtCO_2e$ = million metric tons of carbon dioxide equivalent; $/tCO2e = dollars per metric ton of carbon dioxide equivalent.

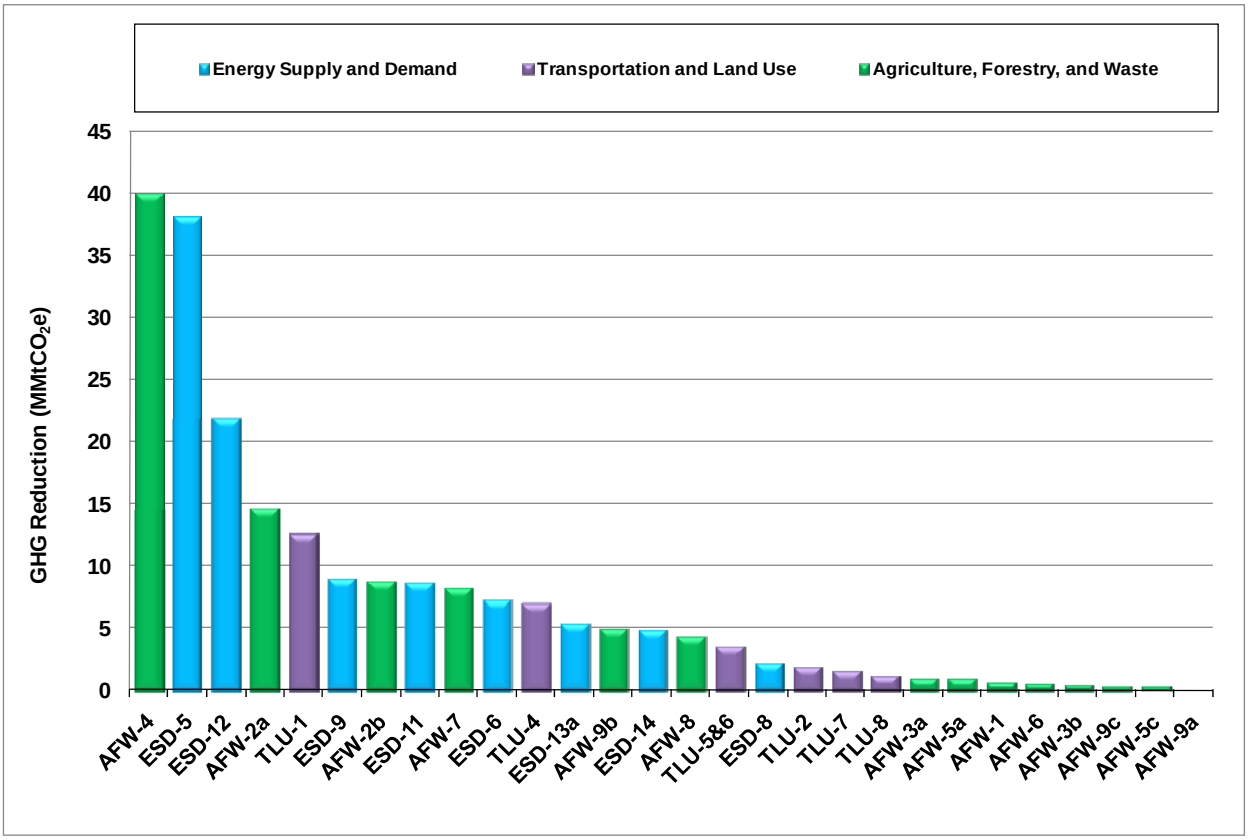
Negative values in the Net Present Value and the Cost-Effectiveness columns represent direct net *cost savings* associated with the options. Within each sector, values have been adjusted to eliminate double counting and other interactions for options or elements of options that overlap.

In order, the sectors with the greatest potential for emissions reductions are:

- energy supply and demand at 56 percent of total reductions and a total net cost savings of $19 per ton;
- agriculture, forestry, and waste management at 27 percent of total reductions and a net cost of $13 per ton; and
- transportation and land use at about 15 percent of total potential emissions reductions and a net cost savings of $86 per ton.

The total net cost savings of all Action Team recommendations combined (after adjustment for overlaps and interactions) is more than $28 billion from 2009 to 2025, at an average net savings of $18 per ton greenhouse gas emissions removed during the same period.

Figure EX-4. Greenhouse gas reductions in 2025 from 28 recommended policies



Key to Figures EX-4 and EX-5	
AFW-1 Forest Restoration	ESD-5a Renewable Portfolio Standards
AFW-2a Afforestation of Forested Landscape	ESD-6 Nuclear Power
AFW-2b Afforestation of Urban Forestry	ESD-8 Combined Heat and Power Systems
AFW-3a Forest Mgt. for Carbon Storage – Pine	ESD-9 Power Plant Efficiency Improvements
AFW-3b Forest Mgt. for Carbon Storage - Public	ESD-11 Landfill Gas-to-Energy
AFW-4 Use of Forestry, Biomass, Feedstocks	ESD-12 Demand-Side Management Programs
AFW-5a Farming Soil Carbon Management	ESD-13a Energy Efficiency in Residential Buildings
AFW-5c Farming Nutrient Management	ESD-14 Improved Building Codes for Efficiency
AFW-6 Reduce Loss of Green Space	TLU-1 Develop and Expand Low-Greenhouse Gas Fuels
AFW-7 Promote In-state Biofuel Production	TLU-2 Low Rolling Resistance Tires
AFW-8 Promote Municipal Solid Waste Tech.	TLU-4 Improve Transportation System Mgt.
AFW-9a Biomass-to-Energy Manure	TLU 5&6 Land Use Planning Processes and Increasing Choices in Modes of Transportation
AFW-9b Biomass-to-Energy Biosolids	TLU 7 Incentive Programs for Increased Vehicle Fleet Efficiency
AFW-9c Biomass-to-Energy Bio-products	TLU 8 Increasing Freight Movement Efficiencies

Quantified recommendations are ranked in Figure EX-4 according to their potential to reduce emissions in 2025. This figure indicates that the greatest reductions are offered by the three policy recommendations known as:

- AFW-4 (Expanded Use of Agriculture, Forestry, and Waste Management, Biomass Feedstocks for Electricity, Heat, and Steam Production);
- ESD-5 (Promoting Renewable Electricity through Renewable Portfolio Standard, Incentives, and Barrier removal); and
- ESD-12 (Demand-Side Management/Energy Efficiency Programs, Funds, or Goals for Electricity).

Figure EX-5 displays the recommendations according to their respective cost-effectiveness, from lowest cost (highest savings) to highest cost. Recommendations with negative numbers represent a total net benefit to Florida's economy after accounting for the costs to implement the recommendation. In most of these cases, a specific investment will be required to initiate the option. Policy recommendations TLU-1 (Develop and Expand Low-Greenhouse Gas Fuels) and TLU-2 (Low Rolling *Resistance Tires and Other Add-On Technologies*) are the policies with the lowest cost-per-ton reduced. Policy recommendation AFW-6 (*Reduce the Rate of Conversion of* Agricultural Land and Open Green Space to Development) has the highest cost per ton.

Figure EX-5. "Opportunity Map" Identifying the Costs and Cost Savings in 2025 from 28 Recommended Policies (Negative Number indicates Cost Savings)

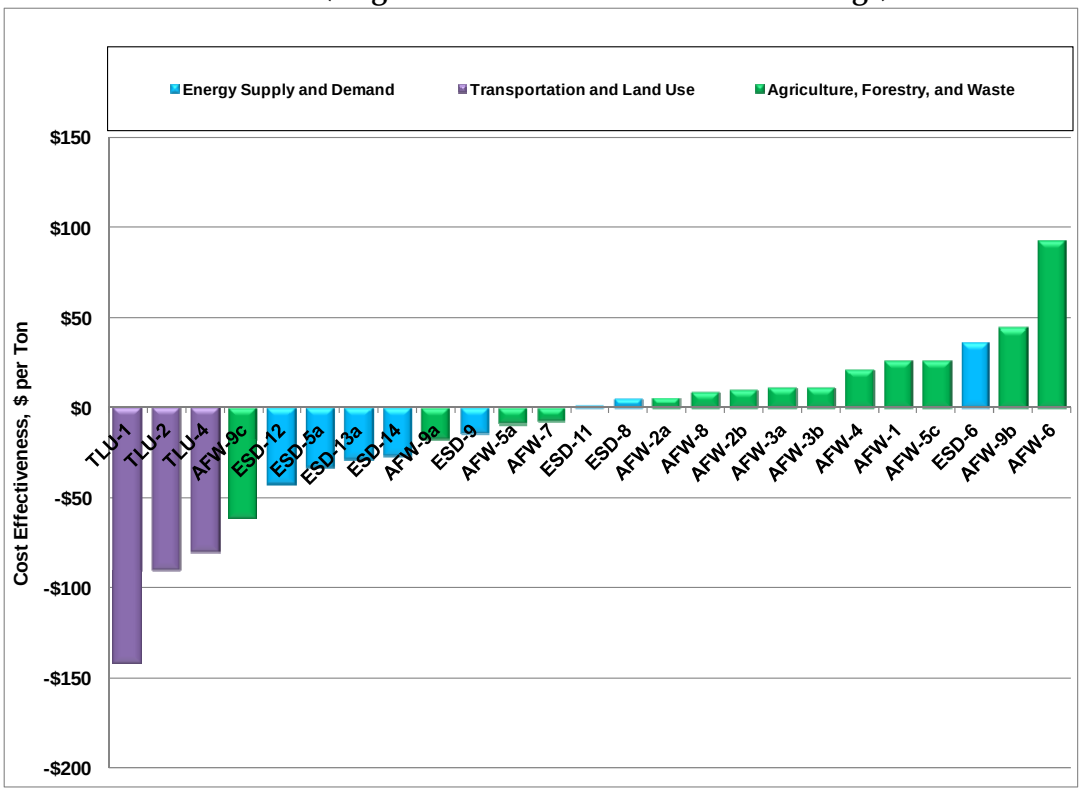
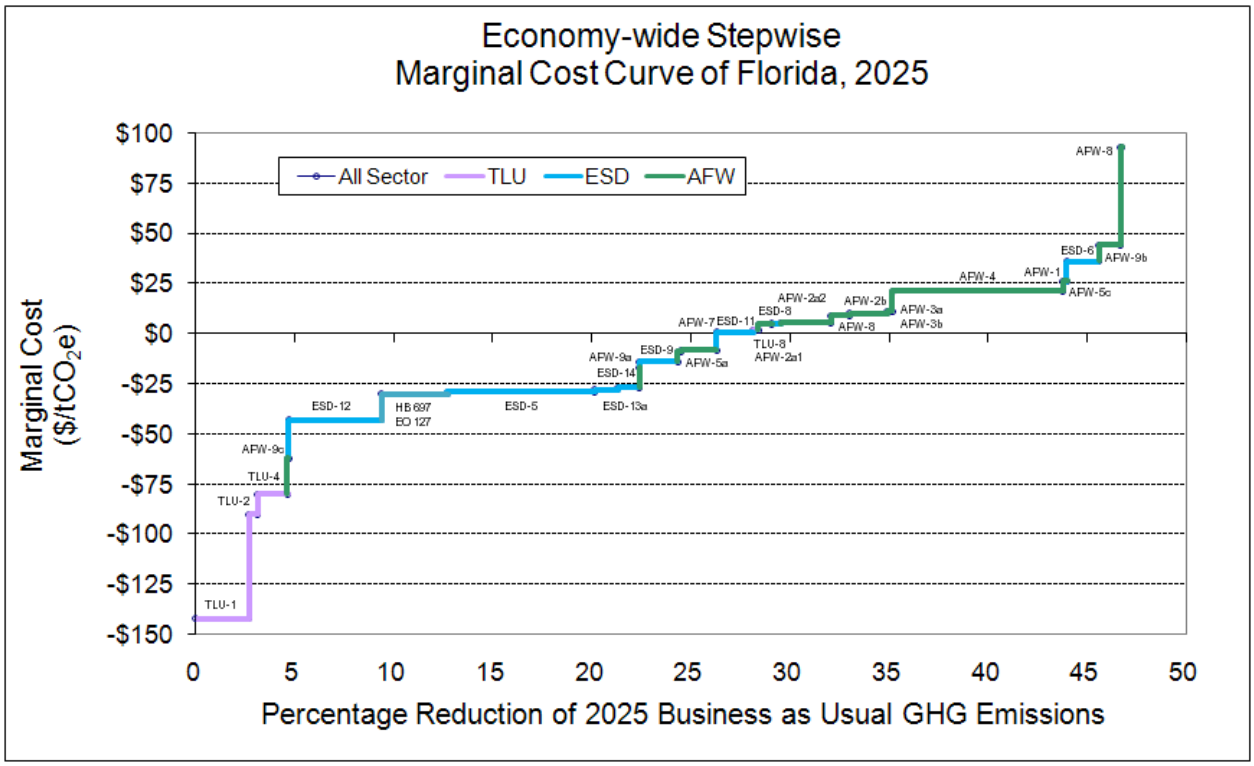


Figure EX-6 displays the quantified policy recommendations in the form of a "cost curve" or step-function showing both policy costs and benefits in 2025. The vertical axis represents the cost or cost savings (negative cost) for each recommendation, which are ranked from lowest cost (highest savings) to highest cost. The horizontal axis represents the amount of greenhouse gas reductions offered by the recommendation, computed as "percent reduction below business-as-usual," with each recommendation's width proportional to its greenhouse gas reduction potential. The wider the recommendation's step, the greater the greenhouse gas mitigation. Each policy moving to the right achieves an increased "percent reduction below Business As Usual," but at an increasing cost.

EX-6. Cost curve for 28 policy recommendations

(Key for Figure EX-6 follows Figure EX-9)



Unquantifiable Recommendations

Some recommendations within this report are not quantified. While many of these unquantifiable policies were estimated by Technical Working Groups and the Action Team to have the likely effect of producing emissions reductions and will involve net costs or cost savings, some of them are foundational—that is, they enable other policies. The lack of quantified results for these recommendations should not be seen as an indication that they are less important or less valuable than the others.

Adaptation

Adaptation represents a unique challenge for Florida. The product of the adaptation investigation is a comprehensive planning framework to guide Florida over the coming years and decades to manage climate impacts that Floridians will likely face regardless of the success of state, national, or international mitigation efforts. The Adaptation recommendations are a comprehensive first look at the issues and opportunities facing Floridians, and contain recommendations for further study and examination as well as measures that can be undertaken immediately to adapt to the many consequences of climate change that may occur in the near future.

Cap-and-Trade

One area of investigation directly assigned to the Phase 2 process from the Phase 1 Report was an examination of cap-and-trade program design. Shortly thereafter, HB 7135 directed the Florida Department of Environmental Protection to initiate rulemaking to create a cap-and-trade program for fossil-fired electric generation plants. The Legislature identified 11 major program design and policy questions to be addressed through rulemaking. The Action Team Chairman (DEP Secretary Michael Sole) suggested that the Action Team provide pre-rulemaking guidance. Therefore, the Action Team asked CCS to perform economic modeling of two policy alternatives, which examined the benefits of Florida joining one of two existing regional climate initiatives. Those results are given in Appendix B. The modeling was not utilized to estimate the cumulative greenhouse gas reductions (or the costs or benefits of the alternatives) in a manner consistent with that used for the other quantified policies. Nor were the emissions reductions and costs of the cap-and-trade options included in the total or summary results. The cap-and-trade program is intended to be implemented concurrently with other recommended policy actions, to guarantee that emissions targets are met within the covered sectors, and, potentially, to generate additional reductions and cost savings.

Government Policy

The Government Policy and Coordination Technical Working Group presented five policies that were ultimately adopted for recommendation by the Action Team. These policies fall into two categories: efforts that enable or enhance the successful implementation of policies recommended for specific sectors, and policies that foster the development and creation of technologies and businesses that mitigate greenhouse gases and promote the creation of jobs and economic growth. Finally, the Government Policy Coordination Technical Working Group examined the multiple planning authorities at all levels of government in Florida, and the Action Team has recommended measures to incorporate greenhouse gas considerations into government planning processes and improve coordination among entities with overlapping jurisdiction.

Energy Security

The Action Team focused considerable time and consideration on the issue of increasing Florida's energy security. Table EX-3 provides a summary total of fuel savings for quantified recommendations by fuel type. Figure EX-7 shows the relative savings of petroleum by policy recommendation. Figure EX-8 shows each recommendation's coal savings by million short tons. Figure EX-9 shows each recommendation's natural gas savings in billions of cubic feet.

Table EX-3. Total fuel savings

Total Fuel Saved 2009-2025 All Recommendations		
Petroleum	53.5	billion gallons
Coal	200.2	million short tons
Natural Gas	6,394.0	billion cubic feet

Figure EX-7. Petroleum savings by recommendation, 2009-2025

(Key for Figure EX-7 follows Figure EX-9)

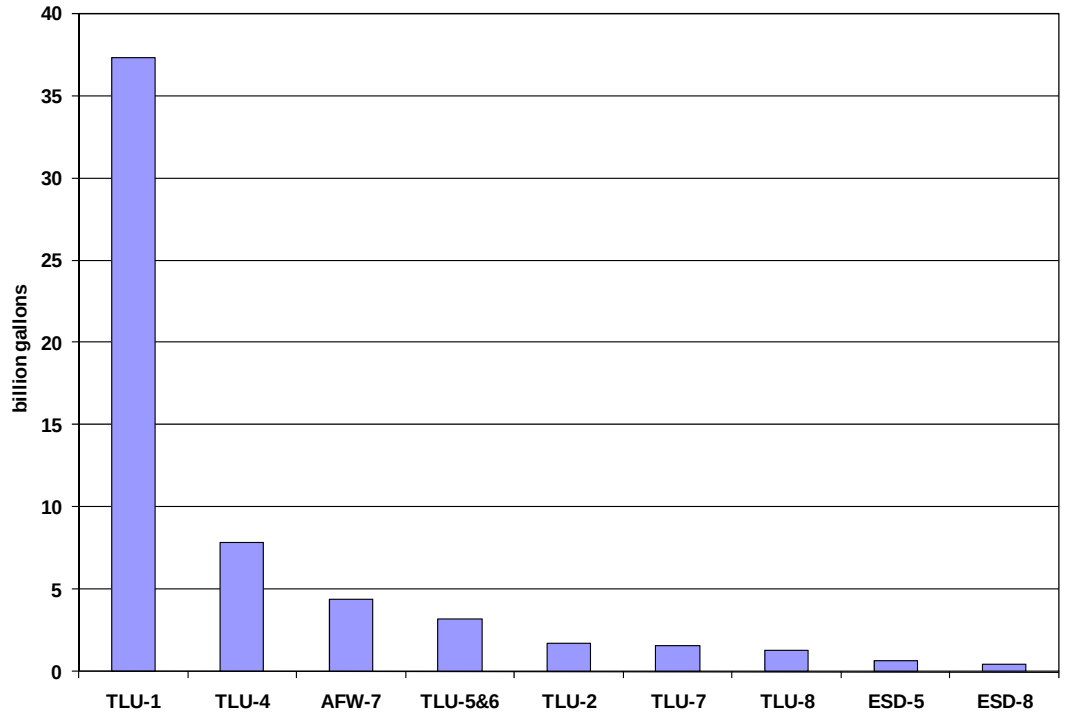


Figure EX-8. Coal savings by recommendation, 2009-2025

(Key for Figure EX-8 follows Figure EX-9)

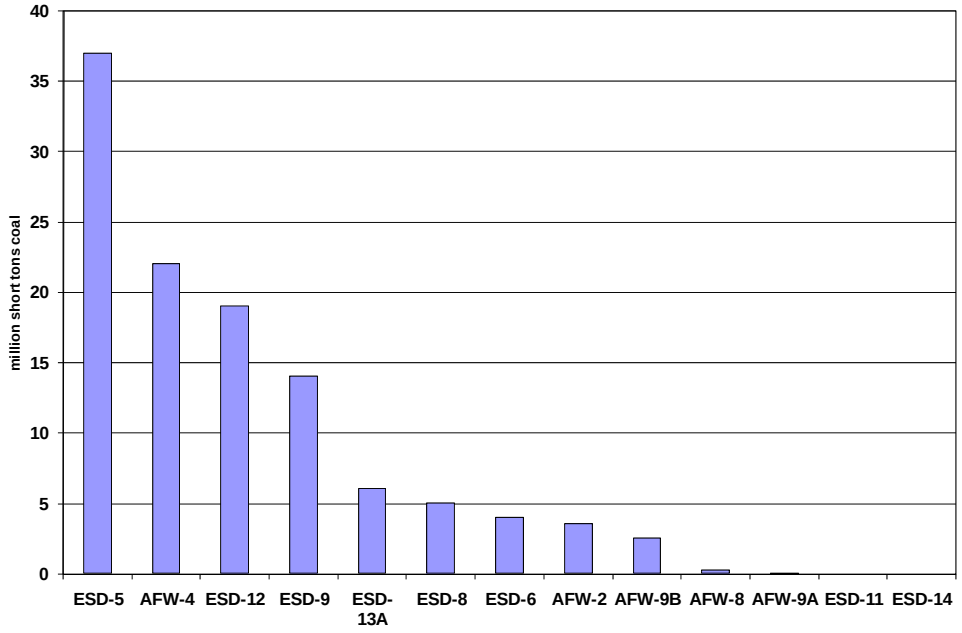
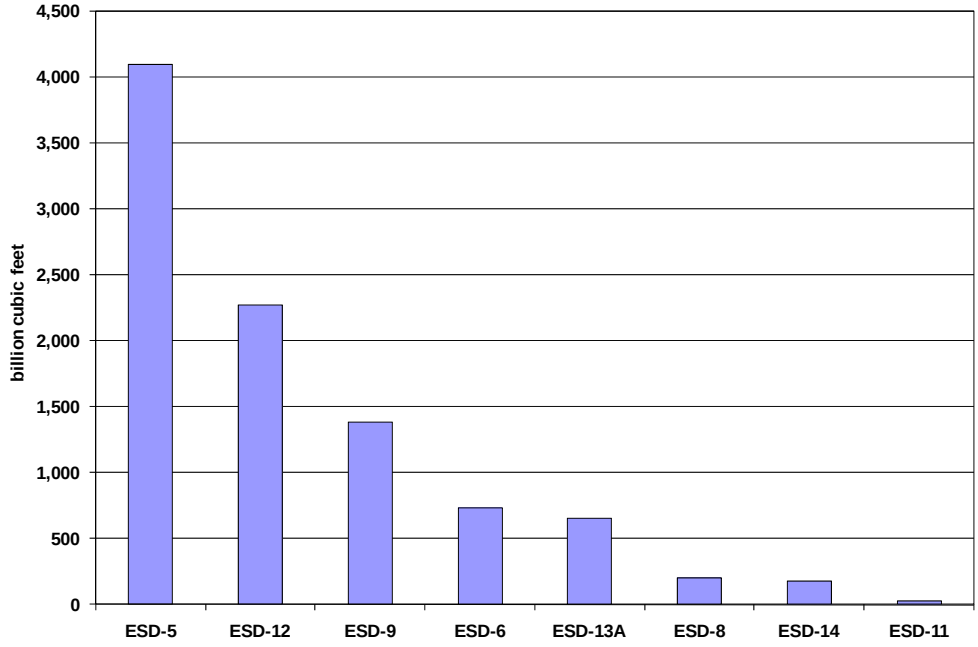


Figure EX-9. Natural gas saved by recommendation, 2009-2025

(Key for Figure EX-9 is on the following page)



Key to Figures EX-7, EX-8, and EX-9	
AFW-1 Forest Restoration	ESD-5a Renewable Portfolio Standards
AFW-2a Afforestation of Forested Landscape	ESD-6 Nuclear Power
AFW-2b Afforestation of Urban Forestry	ESD-8 Combined Heat and Power Systems
AFW-3a Forest Mgt. for Carbon Storage – Pine	ESD-9 Power Plant Efficiency Improvements
AFW-3b Forest Mgt. for Carbon Storage - Public	ESD-11 Landfill Gas-to-Energy
AFW-4 Use of Forestry, Biomass, Feedstocks	ESD-12 Demand-Side Management Programs
AFW-5a Farming Soil Carbon Management	ESD-13a Energy Efficiency in Residential Buildings
AFW-5c Farming Nutrient Management	ESD-14 Improved Building Codes for Efficiency
AFW-6 Reduce Loss of Green Space	TLU-1 Develop and Expand Low-Greenhouse Gas Fuels
AFW-7 Promote In-state Biofuel Production	TLU-2 Low Rolling Resistance Tires
AFW-8 Promote Municipal Solid Waste Tech.	TLU-4 Improve Transportation System Mgt.
AFW-9a Biomass-to-Energy Manure	TLU 5&6 Land Use Planning Processes and Increasing Choices in Modes of Transportation
AFW-9b Biomass-to-Energy Biosolids	TLU 7 Incentive Programs for Increased Vehicle Fleet Efficiency
AFW-9c Biomass-to-Energy Bio-products	TLU 8 Increasing Freight Movement Efficiencies

Action Team Recommendations for Each of the Six TWG Sectors

The following summary tables outline the Action Team's recommendations across each of the six technical working groups. For those recommendations that were quantified during the process, emission reduction potential and cost effectiveness are detailed within each table. Additional detail regarding the policy recommendation is presented in the summary chapters and within the technical appendices of this report.

Table EX-4. Energy Supply and Demand recommendations summary

Policy No.	Policy Recommendation	GHG Reductions ($MMtCO_2e$)			Net Present Value (See Note 2) 2009–2025 (Million $)	Cost-Effectiveness ($/tCO_2e$)	Status of Policy
		2017	2025	Total 2009–2025			
Tier 1							
ESD-5	Promoting Renewable Electricity through Renewable Portfolio Standard (RPS), Incentives and Barrier Removal (20% by 2020)	17	34.5	319	-$9,274	-$29	Approved
ESD-6	Nuclear Power	0.0	7.3	49.4	$1,782	$36	Approved
ESD-7	Integrated Resource Planning (IRP)	Not to be quantified					Approved
ESD-8	Combined Heat and Power (CHP) Systems	1.8	2.2	26.5	$126	$5	Approved
ESD-9	Power Plant Efficiency Improvements	8.4	8.9	111.4	–$1,541	–$14	Approved
ESD-11	Landfill Gas-To-Energy (LFGTE)	3.7	8.7	64.7	$79	$1	Approved
ESD-12	Demand-Side Management (DSM)/Energy Efficiency Programs, Funds, or Goals for Electricity	13.0	21.8	201.4	–$8,566	–$43	Approved
ESD-13a	Energy Efficiency in Existing Residential Buildings	3.4	5.4	50.4	-$1,432	-$28	Approved
ESD-14	Improved Building Codes for Energy Efficiency	0.0	4.9	9.9	-$265	-$27	Approved
ESD-15	Training and Education for Building Operators and Community Association Managers	*Not to be quantified*					Approved
ESD-17	Consumer Education Programs	*Not to be quantified*					Approved
ESD-23	Decoupling	*Not to be quantified*					Approved
Recent Actions							
	Building Codes for Energy Efficiency (HB 697 and Executive Order 127)	8.0	15.4	136.5	-$4,082	-$30	Not applicable
Sector Totals		**47.4**	**93.6**	**832.8**	**-$19,090**	**-$23**	
Sector Totals After Adjusting for Overlaps (see Note 3)		**44.4**	**106.4**	**841.3**	**-$16,143**	**-$19**	
Reductions from Recent Actions		**8.0**	**15.4**	**136.5**	**-$4,082**	**-$30**	
Sector Totals, including recent actions and adjustment for overlaps		**52.4**	**121.8**	**977.8**	**-$20,226**	**-$21**	

Table EX-5. Transportation and Land Use recommendations summary

Policy No.	Policy Recommendation	GHG Reductions ($MMtCO_2e$)			Net Present Value 2009–2025 (Million $)	Cost-Effective-ness ($/tCO_2e$)	Energy Security Fuel Savings (Gallons Saved 2009–2025) (million gallons)	Level of Support
		2017	2025	Total 2009-2025				
TLU-1	Develop and Expand Low-GHG Fuels	6.20	12.62	106.41	–$15,161	–$142	37,290	Approved
TLU-2	Low Rolling Resistance Tires and Other Add-On Technologies	0.80	1.84	13.99	-$1,259	-$90	1,665	Approved
TLU-3	Smart Growth Planning	Not Quantified Separately; Included in Other Analyses						Approved
TLU-4	Improving Transportation System Management (TSM)	3.94	6.98	63.91	-$5,106	-$80	7,858	Approved
TLU-5&6	Land Use Planning Processes and Increasing Choices in Modes of Transportation	1.77	3.54	28.29	NQ	NQ	3,200	Approved
TLU-7	Incentive Programs for Increased Vehicle Fleet Efficiency	0.84	1.56	13.14	NQ	NQ	1,564	Approved
TLU-8	Increasing Freight Movement Efficiencies	0.59	1.10	11.52	$21	$2	1,302	Approved
	Sector Totals	**14.14**	**27.64**	**237.26**	**-$21,505**	**-$110**	**52,879**	
	Sector Total After Adjusting for Overlaps	**12.73**	**25.14**	**214.35**	**-$18,400**	**-$106**	**48,786**	
	Reductions from Recent Actions	**19.10**	**34.11**	**307.24**				
	Sector Total Plus Recent Actions	**31.83**	**59.25**	**521.59**				

Table EX-6. Agriculture, Forestry and Waste Management recommendations summary

Option No.	Policy Option	GHG Reductions ($MMtCO_2e$)			Net Present Value 2009–2025 (Million $)	Cost-Effectiveness ($/tCO_2e$)	Energy Security Fuel Savings	Status of Policy
		2017	2025	Total 2009–2025				
AFW-1	Forest Retention—Reduced Conversion of Forested to Non-Forested Land Uses	0.5	0.6	7.2	$186	$26		Approved
AFW-2	Afforestation and Restoration of Non-Forested Lands							
	A. Forested Landscape							Approved
	Afforestation	1.6	3.1	28	$134	$4.9		
	Reforestation	6.1	11.6	104	$555	$5.3		
	B. Urban Forestry	4.6	8.7	78	$759	$10	3.5 million short tons coal, or 76,000 cubic feet natural gas	Approved
AFW-3	Forest Management for Carbon Sequestration							
	A. Pine Plantation Management	0.5	0.9	7.9	$84	$11		Approved
	B. Non-Federal Public Land Management	0.3	0.4	3.9	$41	$11		Approved
AFW-4	Expanded Use of Agriculture, Forestry, and Waste Management (AFW) Biomass Feedstocks for Electricity, Heat, and Steam Production	21	40	361	$7,432	$21	22 million short tons coal **or** 486,000 cubic feet natural gas	Approved
AFW-5	Promotion of Farming Practices That Achieve GHG Benefits							
	A. Soil Carbon Management	0.5	0.9	8.0	–$74	–$9	5 million gallons of diesel fuel	Approved
	B. Land-Use Management That Promotes Permanent Cover	N/Q						Approved
	C. Nutrient Management	0.2	0.3	2.6	$68	$26		Approved
	D. Improved Harvesting Methods to Achieve GHG Benefits	N/Q						Approved
AFW-6	Reduce the Rate of Conversion of Agricultural Land and Open Green Space to Development	0.2	0.5	4.2	$394	$93		Approved

AFW-7	In-State Liquid/Gaseous Biofuels Production	4.0	8.2	68	–$532	–$8	4,075 million gallons gasoline and 271 million gallons diesel	Approved
AFW-8	Promotion of Advanced Municipal Solid Waste (MSW) Management Technologies (Including Bioreactor Technology)	1.9	4.4	34	$294	$9	190,000 short tons coal **or** 4,000 cubic feet NG **and** 109 million gallons diesel	Approved
AFW-9	Improved Commercialization of Biomass-to-Energy Conversion and Bio-Products Technologies							
	A. Manure Digestion/Other Waste Energy Utilization	0.04	0.09	0.8	–$13	–$17	4,500 short tons coal or 100 cubic feet natural gas	Approved
	B. WWTP Biosolids Energy Production & Other Biomass Conversion Technologies	2.4	5.0	42	$1,848	$44	2.5 million short tons coal or 55,000 cubic feet natural gas	Approved
	C. Bio-Products Technologies and Use	0.2	0.3	2.6	–$161	–$62		Approved
AFW-10	Programs to Support Local Farming/Buy Local	N/Q						Approved
	Sector Totals	**44**	**85**	**752**	**$11,014**	$**15**		
	Sector Total After Adjusting for Overlaps*	**25**	**58**	**469**	**$5,974**	**$13**		
	Reductions From Recent Actions	**—**	**—**	**—**	**—**	**—**		
	Sector Total Plus Recent Actions	***25***	***58***	***469***	***$5,974***	***$13***		

Table EX-7. Government Policy and Coordination recommendations summary

Policy No.	Policy Recommendation	GHG Reductions ($MMtCO_2e$)			Net Present Value 2009–2025 (Million $)	Cost-Effective-ness ($/tCO_2e$)	Status of Policy
		2015	2025	Total 2009–2025			
GP-1	Targets, Reporting, Funding, and Accountability Measures	*Not to be Quantified*					Approved
GP-2	Public Awareness and Education	*Not to be Quantified*					Approved
GP-3	Inter-Governmental Planning Coordination and Assistance	*Not to be Quantified*					Approved
GP-4	"Green" Business Development Policies	*Not to be Quantified*					Approved
GP-5	Introduce Core Competencies Into Professional Licensing Programs	*Not to be Quantified*					Approved

Table EX-8. Adaptation Strategies recommendation summary

Framework Identifier.	Planning Framework Element	Status of Policy
ADP-1	Advancing Science Data and Analysis for Climate Change	Approved
ADP-2	Comprehensive Planning	Approved
ADP-2.1	Local Government Level	Approved
ADP-2.2	Regional Government Level	Approved
ADP-2.3	State Government Level	Approved
ADP-3	Protection of Ecosystems and Biodiversity	Approved
ADP-3.1	Uplands, Freshwater and Marine Systems	Approved
ADP-3.2	Beaches and Beach Management	Approved
ADP-3.3	Species Protection	Approved
ADP-4	Water Resource Management	Approved
ADP-5	Built Environment, Infrastructure and Community Protection	Approved
ADP-5.1	Building Codes and Regulation	Approved
ADP-5.2	Flood Protection	Approved
ADP-5.3	Beaches as Infrastructure	Approved
ADP-5.4	Transportation and Other Infrastructure	Approved
ADP-6	Transportation and Other Infrastructure (moved into ADP-5)	Approved
ADP-7	Economic Development	Approved
ADP-7.1	Tourism	Approved
ADP-7.2	Other Resource-based Industries	Approved
ADP-7.2.1	Agriculture	Approved
ADP-7.2.2	Forests	Approved
ADP-7.2.3	Marine	Approved
ADP-7.2.4	Aquaculture	Approved

Framework Identifier.	Planning Framework Element	Status of Policy
ADP-7.2.5	Mining	Approved
ADP-7.3	Construction	Approved
ADP-8	Insurance (Property and Casualty)	Approved
ADP-9	Emergency Preparedness and Response (Extreme Events)	Approved
ADP-10	Human Health Concerns	Approved
ADP-10.1	Health Care	Approved
ADP-10.2	Air Quality	Approved
ADP-10.3	Wastewater Treatment	Approved
ADP-10.4	Disaster Response	Approved
ADP-10.5	Medical Treatment and Biomedicine Development	Approved
ADP-11	Social Effects	Approved
ADP-11.1	Social Justice Issues	Approved
ADP-11.2	Food and Water Security	Approved
ADP-11.3	Housing	Approved
ADP-11.4	Intersection of Climate Change and Human Behavior	Approved
ADP-12	Organizing State Government for the Long Haul	Approved
ADP-13	State Funding and Financing	Approved
ADP-14	Coordinating with Other Regulatory and Standards Entities	Approved
ADP-14.1	Federal Government	Approved
ADP-14.2	Professional Societies	Approved
ADP-15	Public Education and Outreach	Approved