Executive Summary

Background

On July 12 and 13, 2007, Florida Governor Charlie Crist hosted "Serve to Preserve: A Florida Summit on Global Climate Change." The landmark summit brought together leaders of business, government, science and advocacy to examine the risks posed by global 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 in Miami, Governor Crist signed three Executive Orders and two international partnership agreements that propelled Florida to the forefront of states actively working to address global climate change. Executive Order 07-126 directed state government to lead by example; Executive Order 07-127 established reduction targets for the emissions of greenhouse gases (GHG) in Florida, and Executive Order 07-128 established the Governor's Action Team on Energy and Climate Change (Action Team) 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. The report recommended a range of policies to reduce GHG emissions and increase Florida's energy security including increased energy efficiency and conservation, examination of the potential for capture, sequestration and storage of carbon, expanded production of renewable energy, and further examination of the role of nuclear energy in Florida. A number of key issues were referred to Phase 2 of the process including recommendations on measures to help Florida adapt to the most immediate impacts of climate change and the design of a market-based policy of cap and trade for tradable emissions credits, and establishing linkages with ongoing emissions trading markets.

The Action Team reconvened in February 2008 to begin Phase 2 of the Executive Order 07-128 requirements. As identified in the Action Team's Phase 1 report, a facilitated, stakeholder-based, consensus-building process was developed and the Center for Climate Strategies (CCS) was asked to facilitate and provide technical support for this phase of the process. As part of this effort, the Action Team designated six Technical Work Groups (TWGs) to focus on specific issues and sectors of the economy, and tasked them with responsibility for identifying a full range of potential GHG reduction actions for Florida, suggesting initial priorities and design of policies, providing technical and economic analysis, suggesting alternative policy design and analysis to address potential barriers to consensus, and to suggest approaches to address co-benefits and feasibility issues for consideration by the full Action Team. The Action Team and Technical Working Groups followed a stepwise, fact based, consensus-building process with assistance by CCS.

The Action Team and Technical Work Groups worked diligently in order to meet the October 2008 deadline for completion of the Phase 2 Report. The 27 Action Team members met a total of eight times, representing more than 60 hours of deliberation. The 122 members of the six

Technical Working Groups met more than 71 times, representing more than 155 hours of combined meeting time. The resulting findings and recommendations reflect the substance of this report and are discussed at-length in subsequent sections.

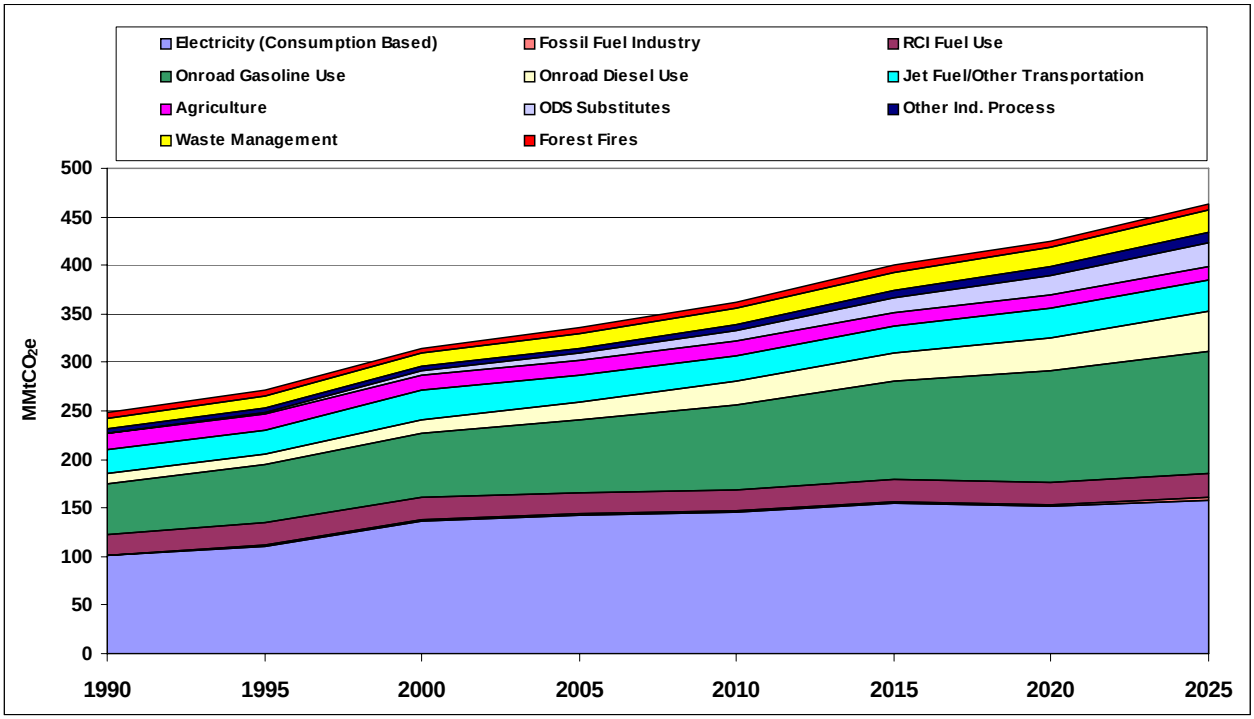
This document is the result of the Action Team's Phase 2 process, called for in the Executive Order 07-128 and further defined in the Phase 1 report, which is included here as Appendix I.

Inventory of Florida's Greenhouse Gas Emissions

As part of the Phase 1 process, the Florida Department of Environmental Protection (DEP) prepared a preliminary GHG emissions inventory and reference case projection to assist the Action Team in understanding past, current, and projected future GHG emissions in Florida and inform the policy development process. This inventory and forecast of the reference case emissions was subsequently updated and enhanced through the Phase 2 process with assistance by CCS and the Technical Working Groups and, ultimately, approval by the Action Team. Figure EX-1 shows substantial emissions growth since 1990, and, absent mitigation measures, emissions are expected to grow through 2025.

Florida's gross emissions of GHGs grew by 35 percent between 1990 and 2005, or roughly twice the national average of 16 percent. Florida's emissions growth was 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, comparable to U.S. per capita emissions which declined slightly (2 percent) over this period. In the absence of recent developments that Florida has undertaken to control its emissions, gross GHG emissions are projected to rise steeply to about 463 million metric tons of carbon dioxide equivalent ($MMtCO_2e$) by 2025, or 86 percent over 1990 levels. Florida's forests serve to capture and store GHG emissions (removal of emissions, or carbon sink). In 2005 Florida's gross emissions accounted for approximately 337 $MMtCO_2e$. On a net emissions basis (i.e., including carbon sinks), Florida accounted for approximately 309 $MMtCO_2e$ of emissions in 2005.

Figure EX-1. Gross GHG emissions by sector, 1990–2020: historical and projected (consumption-based approach) business as usual/base case



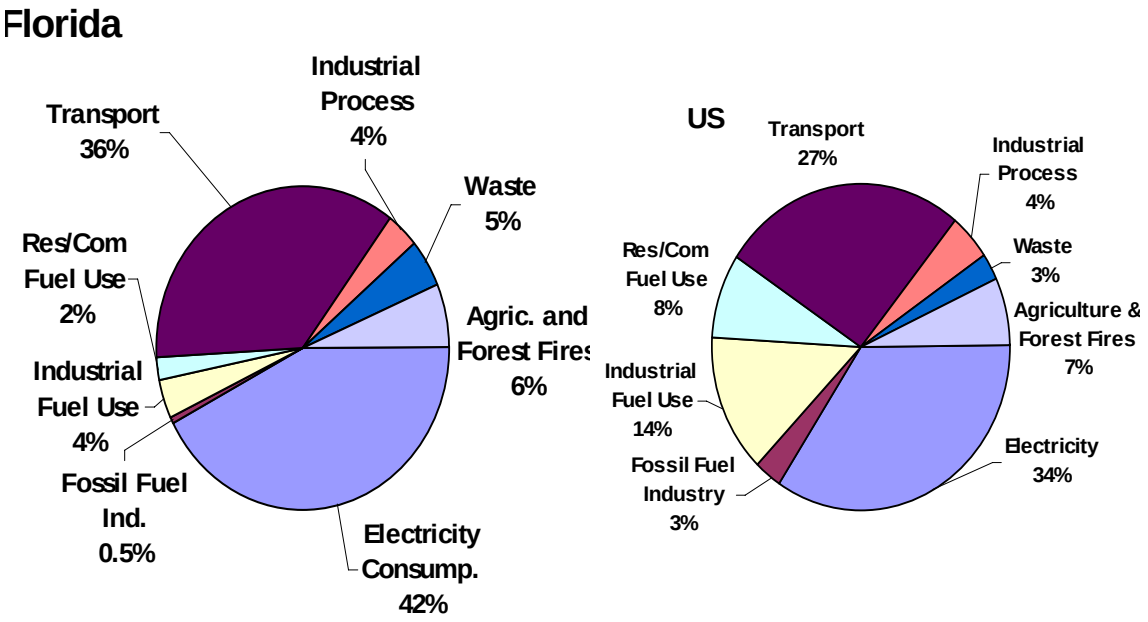
RCI = direct fuel use in residential, commercial, and industrial sectors; ODS = ozone depleting substance.

The principal sources of Florida's GHG emissions in 2005 are electricity consumption and transportation, accounting for 42 percent and 36 percent of Florida's gross GHG emissions, respectively, as shown in Figure EX-2. The direct use of fuels—natural gas, oil products, coal, and wood—in the residential, commercial, and industrial (RCI) sectors accounts for 6 percent of the state's emissions in 2005, significantly lower than the RCI sector contribution for the nation (22 percent). The agricultural and forest wildfire sectors together account for 6 percent of the gross GHG emissions in Florida in 2005. Forestry emissions refer to the net CO_2 flux[1] from forested lands in Florida, which account for about 47 percent of the state's land area.[2] Florida's forests are estimated to be net sinks of CO_2 emissions in the state, reducing net GHG emissions by 27 $MMtCO_2e$ in 2005.

[1] "Flux" refers to both emissions of CO_2 to the atmosphere and removal (sinks) of CO_2 from the atmosphere.

[2] Total forested acreage is 16.3 million acres. For acreage by forest type, see: Richard A. Birdsey and George M. Lewis. "Carbon in United States Forests and Wood Products, 1987–1997: State-by-State Estimates." Florida Estimate for 1987–1997. Available from the U.S. Department of Agriculture, Forest Service, Northern Global Change Research Program, at: http://www.fs.fed.us/ne/global/pubs/books/epa/states/FL.htm. The total land area in Florida is 34.6 million acres (http://www.50states.com/florida.htm).

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



Note: At a national level, forests act as a net sink of CO_2; therefore, they do not show up in the above graph of gross U.S. emissions sources.

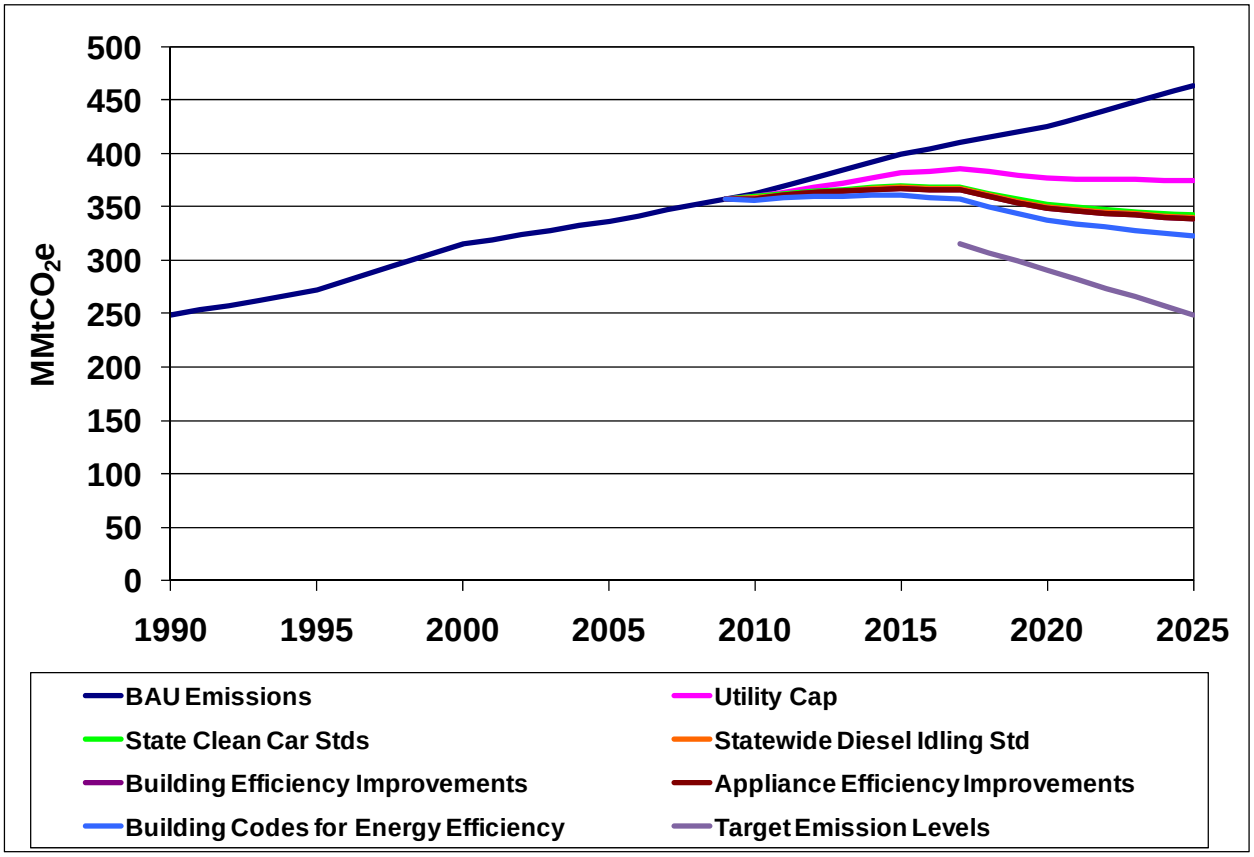
Recent Developments

At the outset of 2008, the State of Florida had a number of energy- and climate change–related initiatives underway. Many of these were in response to the three Executive Orders issued by Governor Crist at the July 2007 "Serve to Preserve" summit. Executive Order 07-126 directed state government to lead by example; Executive Order 07-127 established reduction targets for the emissions of greenhouse gases in Florida, and Executive Order 07-128 established the Governor's Action Team on Energy and Climate Change.

In February 2008, the Governor's Action Team resumed its deliberations and intensified its examination of policy options to include in the Phase 2 Report. The Florida Energy Commission (created by the 2006 Legislature) submitted its final report, which contained a wide range of recommendations relating to energy affordability, security, efficiency, reliability, and climate change. The Legislature enacted several bills that significantly impacted energy and climate change issues. The most notable legislation was House Bill 7135. This comprehensive energy bill codified many of the provisions contained in Governor Crist's 2007 Executive Orders, in addition to enacting a comprehensive list of new measures and authorizations to move Florida in the direction of clean energy and reduced GHG emissions.

While many of the recently enacted policies and programs are in the developmental stage, Florida can point to a significant number of early achievements in the areas of state-operations GHG emissions reductions, renewable energy, utility-based solar energy, energy efficiency, and related research. Figure EX-3 shows the total GHG emissions since 1990 and the reference case projection of emissions from 2005 through 2025 (blue line). Below this reference case are a

Figure EX-3. Emission reductions associated with recent Executive Order actions in Florida (consumption-basis, gross emissions)



$MMtCO_2e$ = million metric tons of carbon dioxide equivalent; CIP = Conservation Improvement Program; RCI = Residential, Commercial, and Industrial [Sectors]; RES = Renewable Energy Standard; ES = Energy Supply.

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 cumulative effect of these efforts is to arrest the upward trend of emissions growth and, by about 2015, begin a real reduction in emissions moving toward 2025. The impact of these recent actions is substantial. In 2025, the expected Florida reference case emissions are 463.28 $MMtCO_2e$, but after considering reductions from measures that Florida has already taken or is committed to taking, the total emissions are expected to be brought down to 323.33 $MMtCO_2e$, or a 33 percent reduction from the reference case. By comparison, this level is about 29 $MMtCO_2e$ *below* estimated current 2008 emissions.

Impressive as they are, these reductions do not achieve the governor's targeted reductions for 2017 or 2025, contained in Executive Order 07-127. Figure EX-3 shows the levels that would have to be met to reach these targets as the lowest line segment running from 2017 to 2025. The challenge to the Action Team was to recommend a package of policies and measures that will meet or exceed these targeted reductions.

Action Team Recommendations

The Action Team recommends 50 policy actions, in addition to offering a suite of 11 recommendations as pre-rulemaking guidance to DEP for a cap-and-trade market-based emissions limiting program. All polices were recommended by unanimous consent (although two decisions within the cap-and-trade recommendations had dissenting votes). Explanations of individual qualifications are in the appendices to this report containing the detailed accounts of the Action Team's recommendations.

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.

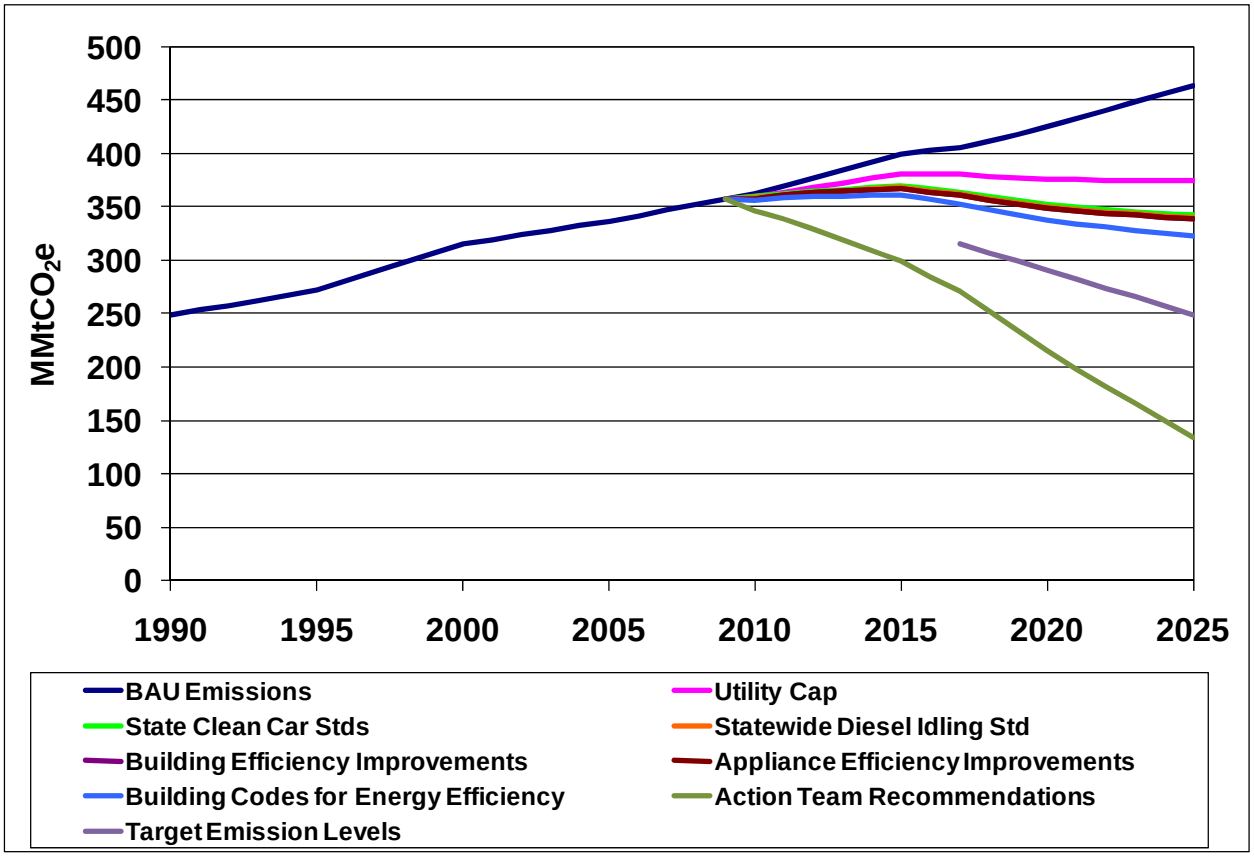
Table EX-1. Annual emissions: reference case projections and impact of Action Team recommendations (consumption-basis, gross emissions)

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)				52.1	139.9
Projected GHG Emissions After Recent Actions				352.9	323.3
Target Emission Levels				315.0	248.8
Total GHG Reductions From Action Team Recommendations				82.6	189.8
Difference Between Action Team Reductions and Target Emission Levels				-44.7	-115.2
Projected Annual Emissions After Quantified Action Team Reductions				270.3	133.6

$MMtCO_2e$ = million metric tons of carbon dioxide equivalent; GHG = greenhouse gas.

Figure EX-4 is the same as EX-3, with the addition of a line representing the cumulative benefits of the Action Team's quantified policy recommendations. Assuming all recommended policies are adopted, in 2017 total emissions would drop to 270.3 $MMtCO_2e$, or 33 percent below the reference case and 14 percent below the governor's 2017 target. In 2025, assuming all recommended policies are adopted, total emissions would drop to 133.2 $MMtCO_2e$, more than 70 percent below the reference case and 46 percent below the Governor's 2025 emissions target.

Figure EX-4. Annual GHG emissions: reference case projections and Action Team recommendations (consumption-basis, gross emissions)



$MMtCO_2e$ = million metric tons of carbon dioxide equivalent; GHG = greenhouse gas.

Table EX-2 provides a summary by sector of the estimated cumulative impacts of implementing all of the Action Team's recommendations. Tables EX-4 through EX-8 show the estimated GHG reductions and net costs or savings from each policy recommendation as well as cumulative impacts. 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.

The end result of quantification of Action Team recommendations was based on multiple Technical Working Group and Action Team discussions in which members provided specifications for analysis to CCS, followed by review and revision of information presented by CCS, and subsequent group agreement on suggested revisions and next steps to completion. As such, final results represent a best effort with best available information developed during the course of the Phase 2 process. The framework of analysis was based on widely accepted principles and guidelines for public policy impact proposed by CCS for member review, including the U.S. Environmental Protection Agency (EPA) Science Advisory Board, Guidelines for Economic Analysis, year 2000. Sector specific guidelines and common assumptions were proposed by CCS to Technical Working Groups for review and revision to provide consistency of analysis across actions within sectors. A detailed description of quantification methods is

included in the appendix for each Technical Working Group area. Detailed policy option descriptions for each Action Team recommendation include specific data sources, methods, assumptions, and key uncertainties recommended by Technical Working Groups and agreed to by the Action Team.

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

Sector	GHG Reductions ($MMtCO_2e$)			Net Present Value 2009–2025 (Million $)	Cost-Effective-ness ($/tCO_2e$)
	2017	2025	Total 2009–2025		
Energy Supply	44.4	106	841	–$16,143	–$19
Transportation and Land Use	12.7	25.1	237	–$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**

GHG = greenhouse gas; $MMtCO_2e$ = million metric tons of carbon dioxide equivalent; $/tCO_2e$ = 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.

N/A = not available; for TLU policies, an overall cost-effectiveness value is not provided because costs or cost savings were not estimated for all of the policies (due to the lack of data) for which emission reductions were estimated. Similarly, an overall cost-effectiveness value for all sectors is not provided for the same reason.

Note that the row in Table EX-2 for the RCI sectors includes only that portion of RCI emissions reductions and net cost savings that are from RCI options (or elements of options) that affect fuels that are combusted for purposes other than to generate electricity. RCI emissions reductions and net cost savings that affect electricity use or generation are included in the "Integrated RCI and ES for electricity" row in Table EX-2, because the benefits and costs of electricity-sector options are dependent on the electrical load served, which is affected by RCI electricity savings.

The sector with the greatest potential for emissions reductions is energy supply and demand at 56 percent of total reductions and a total net cost savings of $19 per ton, followed by agriculture, forestry and waste management at 27 percent of total reductions and a net cost $13 per ton. Transportation and land use accounted for about 15 percent of total potential emissions reductions and a net cost savings of $86 per ton. Total net cost savings of all Action Team recommendations combined (after adjustment for overlaps and interactions) is over $28 billion from 2009 to 2025, at an average net savings of $18 per ton greenhouse gas emissions removed during the same period.

As noted above, government policy and coordination recommendations are not quantified, as are several others in the remaining sectors. Many of these unquantified 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. Still others do not lend themselves to quantification, or the nature of the policy is so speculative or uncertain that projections of emissions reductions and costs would have little value. The lack of quantified results should not, however, be seen as an indication that these recommendations are less important or less valuable than the others.

A significant unquantified set of recommendations can be found in the adaptation section. Adaptation represents a related, but different 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 challenges posed by climate impacts that Floridians will likely face regardless of the success of state, national or international mitigation efforts. Florida must prioritize efforts to adapt to the inevitable social, economic, and environmental consequences of sea level rise, increased frequency and intensity of storms, encroachment of new invasive species, loss of habitat for native species and the many affects of ocean acidification. 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 will occur in the near future.

One area of investigation directly assigned to the Phase 2 process was an examination of the opportunities offered by a national, regional or Florida-only cap-and-trade program. Subsequent to the charge from the Phase 1 report, HB 7135 directed DEP 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, and DEP Secretary Michael Sole charged the Action Team with the job of providing pre-rulemaking guidance on these questions. 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 used to estimate the cumulative GHG 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 reductions and cost saving beyond those presented here.

Quantified recommendations are ranked in Figure EX-5 according to their potential to reduce emissions in 2025. This figure indicates that the greatest reductions are offered by policies AFW-4, (*Expanded Use of Agriculture, Forestry, and Waste Management (AFW) Biomass Feedstocks for Electricity, Heat, and Steam Production*); ESD-5 (*Promoting Renewable Electricity through Renewable Portfolio Standard (RPS), incentives and barrier removal*), and ESD-12 (*Demand-Side Management (DSM)/Energy Efficiency Programs, Funds, or Goals for Electricity*).

Figure EX-6 displays the recommendations according to their cost effectiveness, from lowest cost (highest savings) to highest cost. Policies TLU-1 (*Develop and Expand Low-GHG Fuels*) and TLU-2 (*Low Rolling Resistance Tires and Other Add-On Technologies*) are the policies with the lowest cost-per-ton reduced. Policy 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. GHG reductions in 2025 from 28 recommended policies

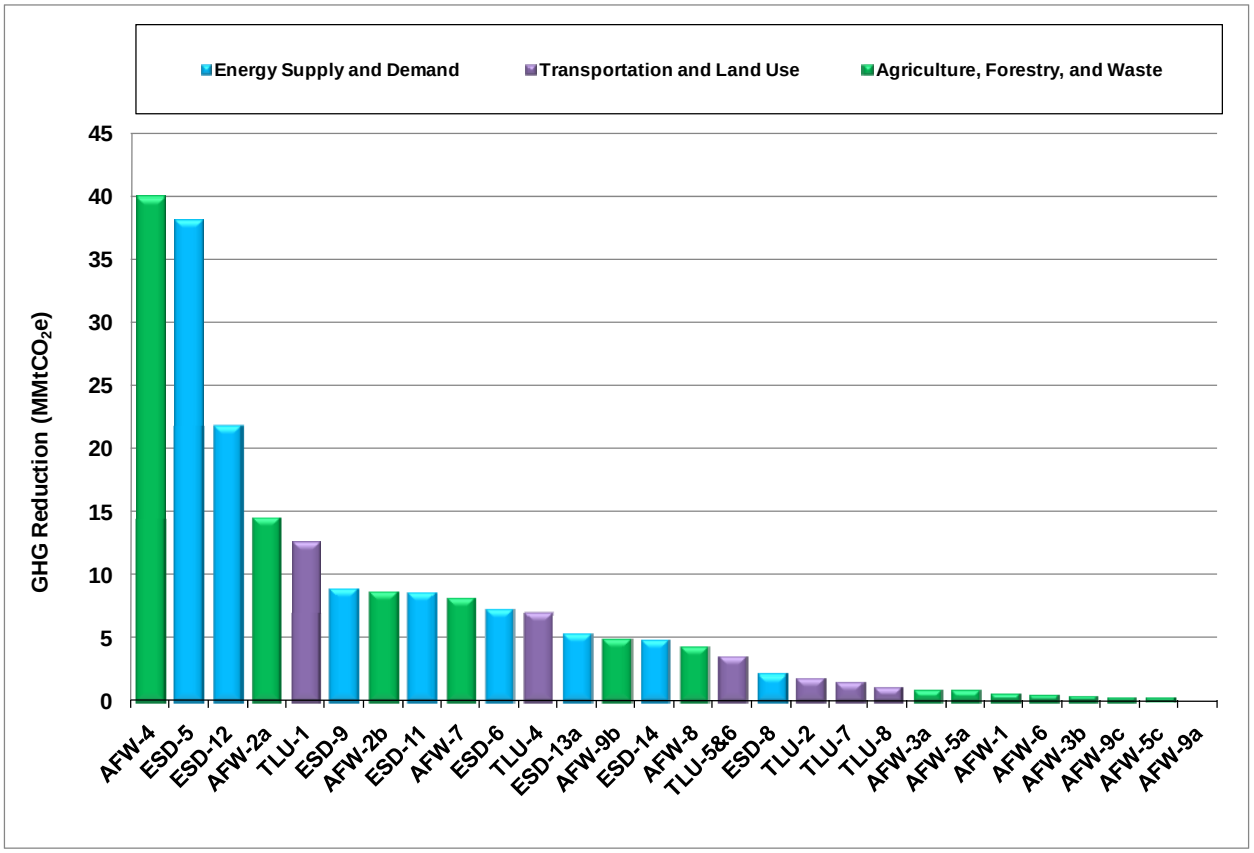
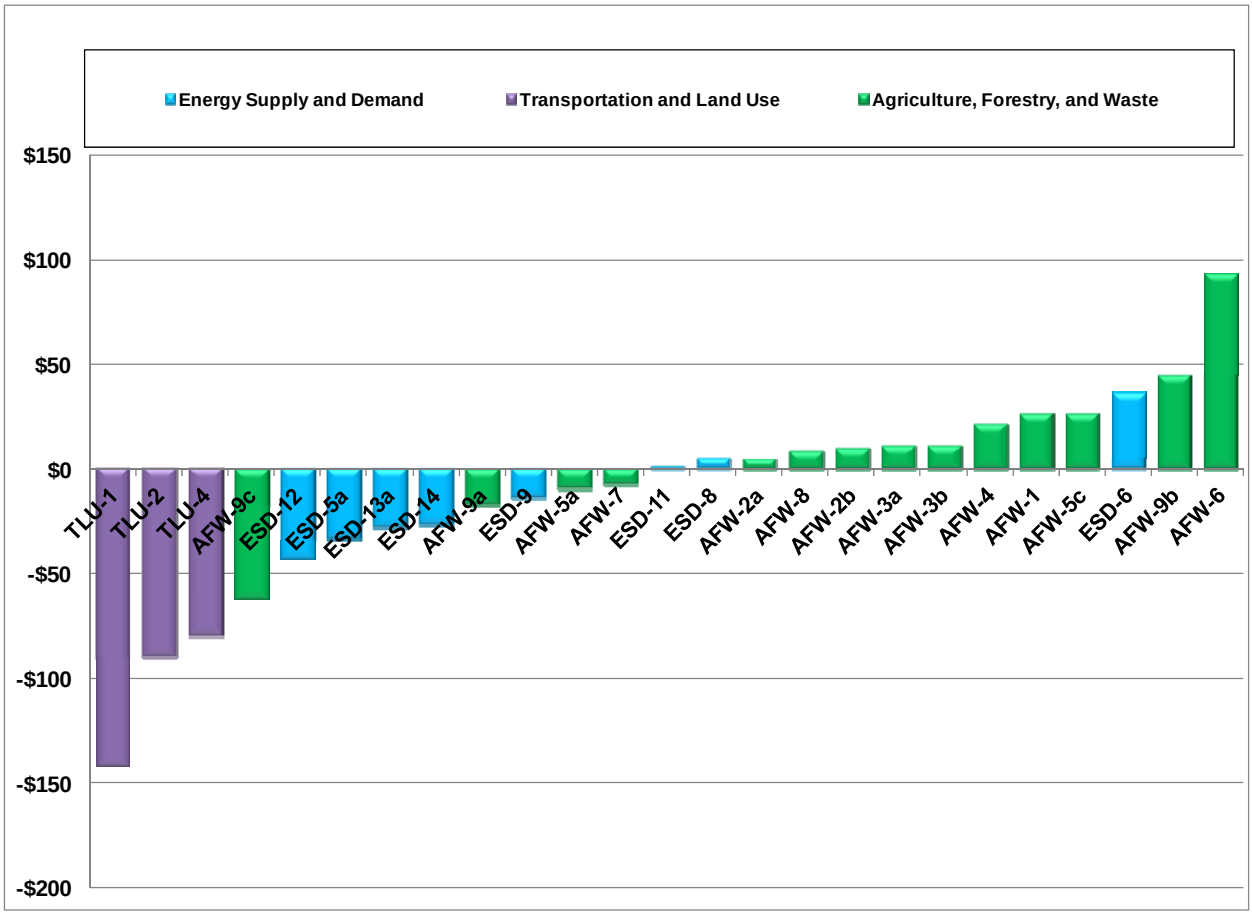


Figure EX-6. Cost and cost savings in 2025 from 28 Recommended Policies



Another area of concern to the Action Team is the energy security benefit represented by each recommendation. While the primary focus of the Action Team's analysis is GHG reductions and sequestration, each of these policies will also reduce the consumption of fossil fuels, either directly or indirectly. 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, and table EX-3 gives the total fuel savings for all recommendations by fuel type.

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

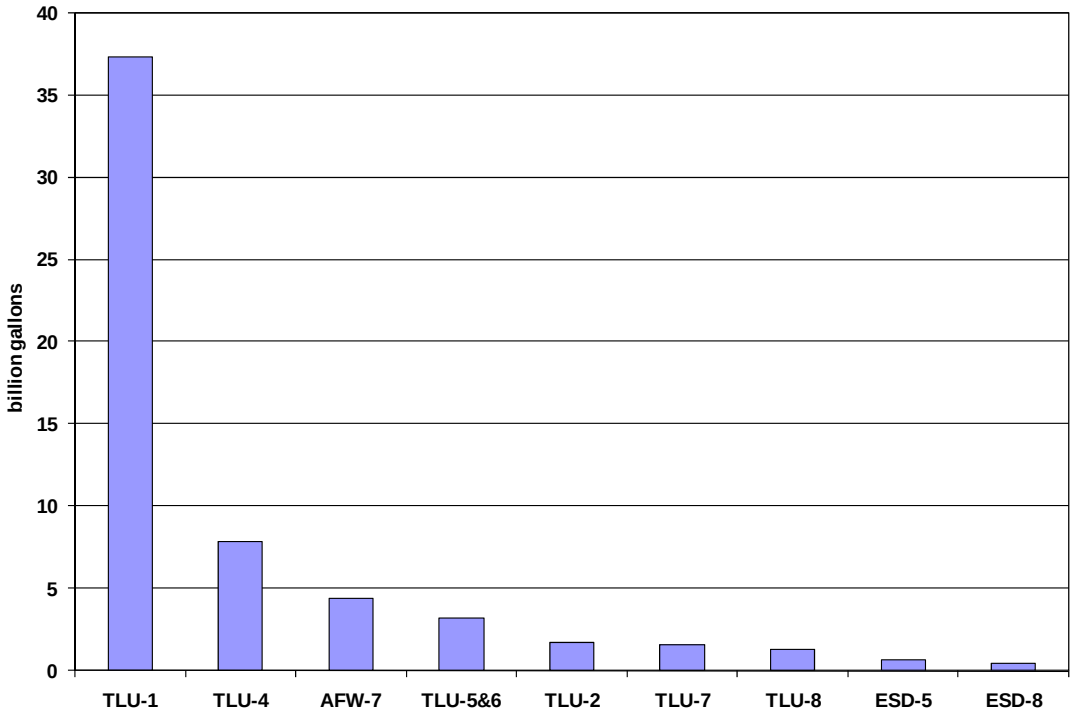


Figure EX-8. Coal savings by recommendation, 2009-2025

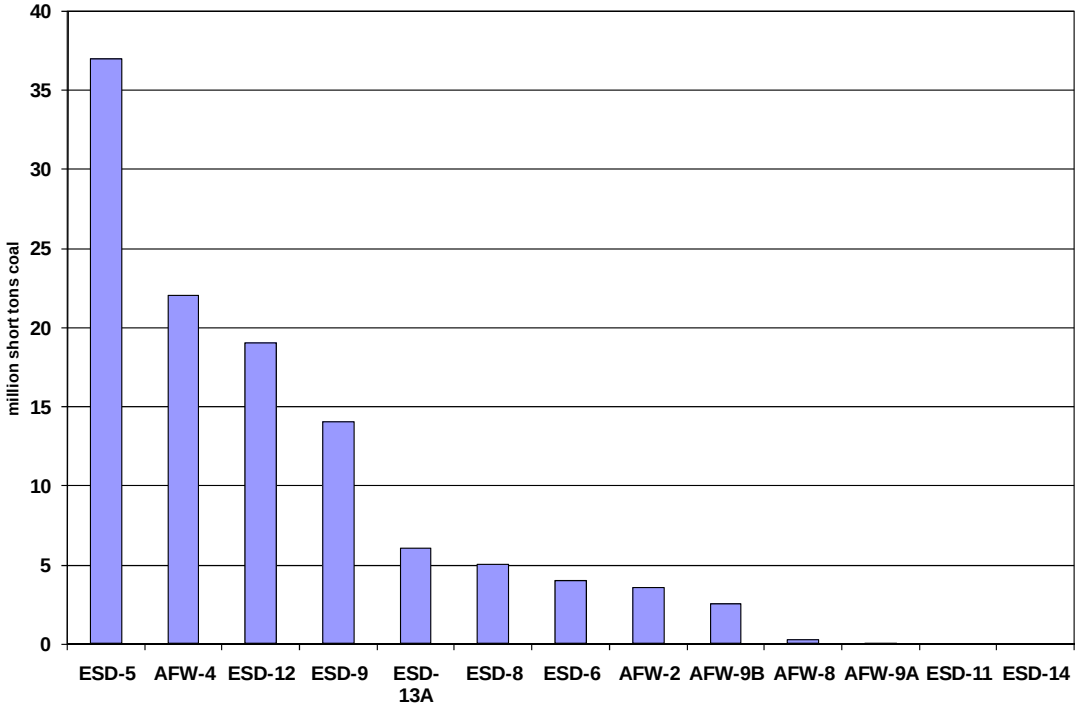


Figure EX-9. Natural gas saved by recommendation, 2009-2025

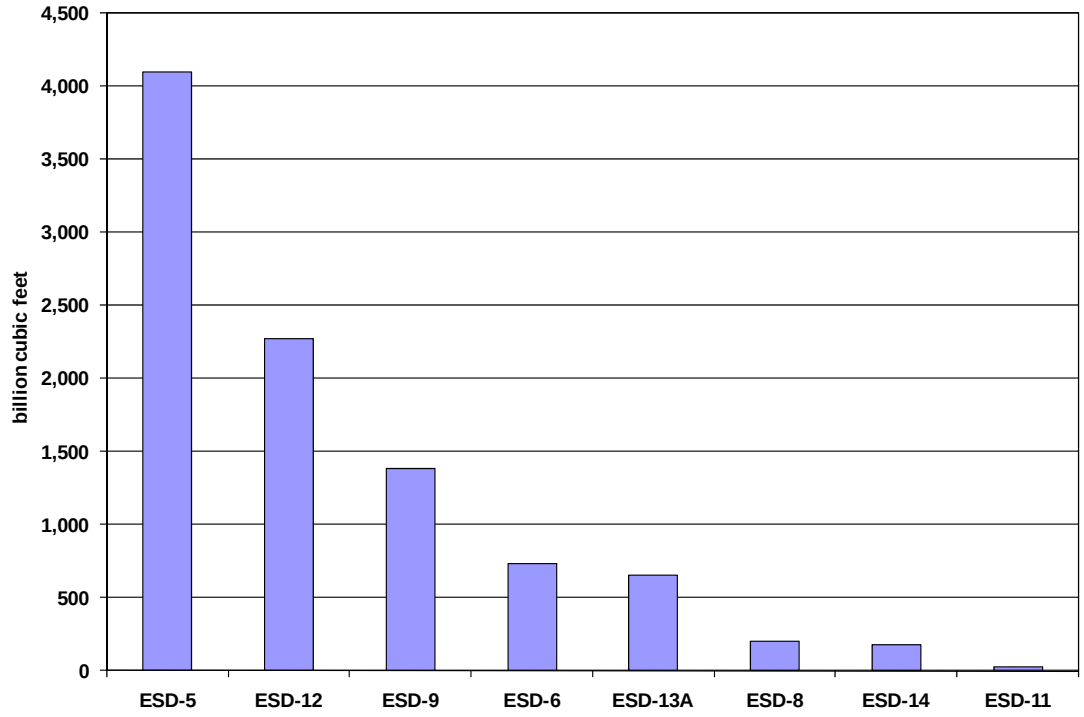


Figure EX-10 displays the quantified policy recommendations in the form of a "cost curve" or step-function showing both policy costs and benefits in 2025. The vertical axis represents the cost or cost savings (negative cost) for each recommendation, which are ranked from lowest cost (highest savings) to highest cost. The horizontal axis represents the amount of GHG reductions offered by the recommendation, computed as "percent reduction below business-as-usual", with each recommendation's width proportional to its GHG reduction potential. The wider the recommendation's step, the greater the GHG mitigation. Each policy moving to the right achieves an increased "percent reduction below Business As Usual (BAU)," but at an increasing cost.

EX-10. Cost curve for 28 policy recommendations

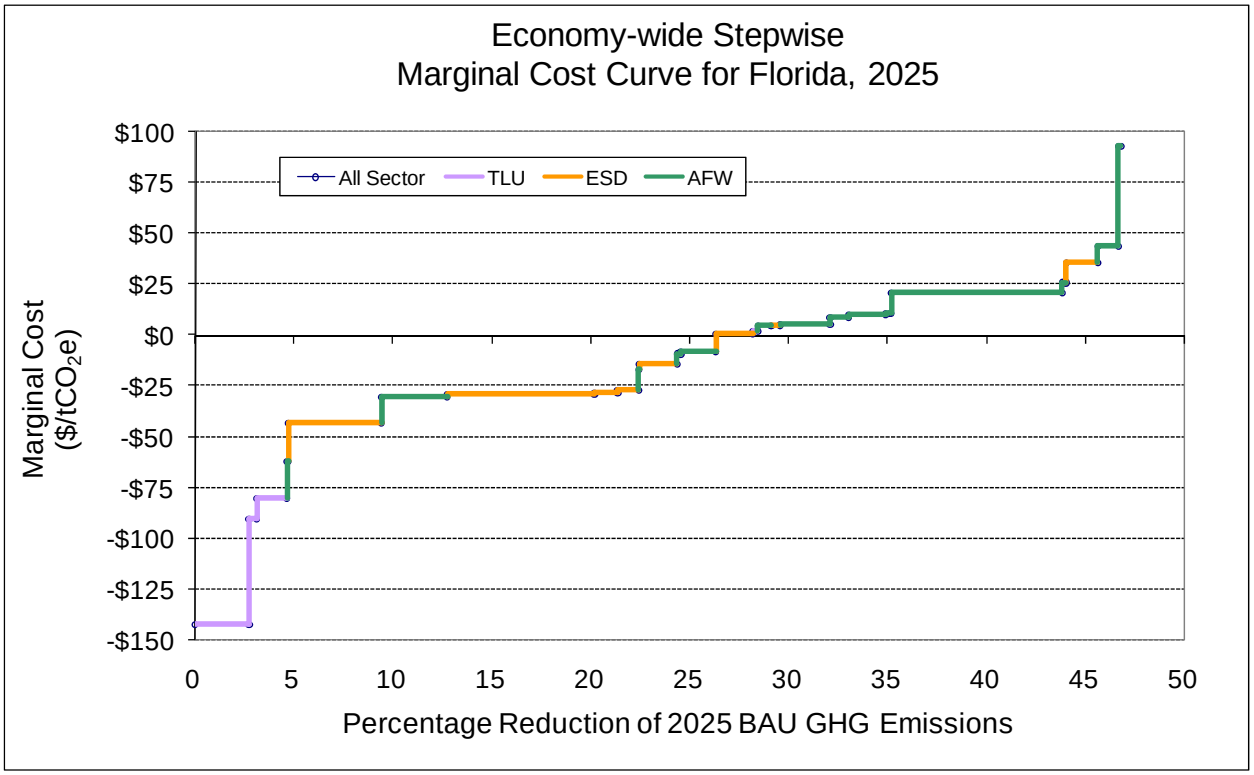


Table EX-4. Energy Supply and Demand recommendations summary

Policy No.	Policy Recommendation	GHG Reductions ($MMtCO_2e$)			Net Present Value (See Note 2) 2009–2025 (Million $)	Cost-Effective-ness ($/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	Pending
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-4a. Energy Supply and Demand energy security summary

Policy No.	Policy Option	Energy Security Fuel Savings (Saved 2009 - 2025)		
		Coal (million short tons)	Natural gas (billion cubic feet)	Petroleum (million gallons)
Tier 1				
ESD-5	Promoting Renewable Electricity through Renewable Portfolio Standard (RPS), incentives and barrier removal (20% by 2020)	37	4,092	654
ESD-6	Nuclear Power	4	733	61
ESD-7	Integrated Resource Planning (IRP)	*Not quantified*		
ESD-8	Combined Heat and Power (CHP) Systems	5	198	431
ESD-9	Power Plant Efficiency Improvements	14	1,383	241
ESD-11	Landfill Gas-To-Energy (LFGTE)	0	27	4
ESD-12	Demand-Side Management (DSM)/Energy Efficiency Programs, Funds, or Goals for Electricity	19	2,266	326
ESD-13a	Energy Efficiency in Existing Residential Buildings	6	650	100
ESD-14	Improved Building Codes for Energy Efficiency	0	171	4
ESD-15	Training and Education for Building Operators and Community Association Managers	*Not quantified*		
ESD-17	Consumer Education Programs	*Not quantified*		
ESD-23	Decoupling	*Not quantified*		
Recent Actions				
	Building Codes for Energy Efficiency (HB 697 and Executive Order 127)	16	1,750	279
Sector Totals		**85**	**9,520**	**1,822**
Sector Totals After Adjusting for Overlaps (see Note 3)		**172**	**6,394**	**68**
Reductions from Recent Actions		**16**	**1,750**	**279**
Sector Totals, including recent actions and adjustment for overlaps		**188**	**8,144**	**347**

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$_2$e)	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 (TLU) 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**	**-$91**	**52,879**	
	Sector Total After Adjusting for Overlaps	**12.73**	**25.14**	**214.35**	**-$18,400**	**-$86**	**48,786**	
	Reductions from Recent Actions	**17.68**	**32.39**	**284.00**				
	Sector Total Plus Recent Actions	**30.41**	**57.53**	**498.35**				

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 $)	Cost-Effectiveness ($/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
ADP-7.2.5	Mining	Approved
ADP-7.3	Construction	Approved

Framework Identifier.	Planning Framework Element	Status of Policy
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