



Macro Economic Analysis of Florida's Energy and Climate Change Action Plan Recommendations

A rigorous, state-of-the-art macroeconomic analysis of the effects of *Florida's Energy and Climate Change Action Plan (CAP)* indicates that, on balance, the implementation of the recommended climate change policies by the *Governor's Energy and Climate Action Team* would be significantly beneficial for Florida's economy in the short and long term.

The Florida plan was completed in October 2008 after nearly a year of comprehensive fact finding, policy development and collaboration by more than 100 state appointed Action Team volunteers representing a wide range of interests and expertise in Florida. It resulted in development of a comprehensive portfolio of sector based and economy wide measures that would surpass the emissions reduction target set by Governor Charlie Crist by Executive Order in 2007, and provide an estimated \$28 billion of net savings by 2025.

Michael Sole, Secretary of the Florida Department of Environmental Protection, chaired the Action Team process. Facilitative and technical assistance was provided by the Center for Climate Strategies (a nonpartisan, non-profit organization that has assisted 20 U.S. states with climate action plan development).

A macroeconomic analysis was conducted as a supplement to the Action Team recommendations using the Regional Economic Modeling, Inc. (REMI) Policy Insight Model. Dr. Adam Rose and Dr. Dan Wei of the University of Southern California, and the REMI staff, in cooperation with the state of Florida, conducted the study through the Center for Climate Strategies. Dr. Rose is an internationally recognized expert on the economics of energy and environmental policy and economics with more than 35 year of experience in these fields.

The macroeconomic analysis estimates that the implementation of 28 policy recommendations* would result in the following outcomes between 2009 and 2025:

- 148,000 net job gains.
- \$38 billion net cumulative increase in state economic activity in terms of Gross State Product (expressed in net present value terms in Year 2000 dollars).
- Reduction of greenhouse gas emissions to 20 percent below 1990 levels by 2020, equal to 1.9 billion tons of greenhouse gas emissions (33 percent better than the state's goal of returning to 1990 emissions levels by 2025).
- Net savings of 53.5 billion gallons of petroleum, 200.2 million short tons of coal, and 6.394 billion cubic feet of natural gas.

Almost half of these projected economic benefits would be stimulated by adoption of a single policy measure crafted by the Action Team – a Florida-specific Renewable Portfolio Standard

* Of the 50 CAP recommendations 28 could be analyzed to quantify their estimated green house gas reductions and cost effectiveness. This analysis contributed both to the CAP process and data for the Florida macroeconomic study.

(RPS). Calculations in the study show that an RPS by itself would reduce 319 million tons of cumulative carbon dioxide and other greenhouse gas emissions by 2025 while contributing more than \$16 billion in net new economic activity and creating almost 37,000 new jobs. Renewable energy investments are relatively labor intensive in comparison to conventional alternatives.

Three others measures also emerge from the study as economically beneficial.

- Creation of new forests (called afforestation) and restoration of previously forested lands in Florida would create more than \$8 billion of net new cumulative economic activity and 40,000 net new jobs, while reducing carbon emissions 210 million tons.
- Developing and expanding use of low-carbon fuels in Florida would bring almost \$4 billion of net economic benefit and create more than 11,000 net new cumulative jobs, while reducing GHG emissions by more than 100 million tons.
- Promoting energy efficiency in existing residential buildings in Florida would bring \$3 billion in net cumulative economic benefit to the Florida economy and create almost 11,000 net new jobs, while reducing GHG emissions by 50 million tons.

The REMI model has been extensively peer-reviewed and is the most widely used state-level economic modeling software package in the United States, having been applied successfully to forecast the impacts of changes in tax rates, the exit or entry of major businesses, and the impacts of energy and environmental policy actions by many states.

The macroeconomic analysis took into account the fact that many of the economic benefits take place over a time horizon of future years, and factored in the time value of money by converting future dollars into present value to allow an apples-to-apples comparison of costs and benefits. The REMI model accommodates state-specific inputs and is particularly sensitive to what are called “multiplier effects.” This allows the model to forecast the effect of policies as they ripple through the economy and interact with each other, both positively and negatively.

The complete macroeconomic analysis considered the 28 policy measures in *Florida's Energy and Climate Change Action Plan* that the Florida Action Team quantified in terms of cost effectiveness and GHG reductions. In the course of development of micro economic analysis for the policies, the analytical methods, data sources, and assumptions for each were reviewed, tested and subjected to formal consensus determinations by Florida stakeholders and technical work group members. In the end, all 50 recommendations, including the 28 quantified and analyzed in the study reported here, were adopted by unanimous vote of the Action Team. Some measures were not quantified based on limited need or ability for analysis.

The macroeconomic study affirms the Action Team's intention that their recommendations would benefit Florida's economy. As the Action Team identified, crafted and analyzed potential policy measures, it was guided by decision criteria that included emissions reduction potential, economic consideration, feasibility considerations, and energy impacts. The following statement from their report to the Governor evidences the focus by the Action Team on economic issues and performance:

“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."

In the table attached below, the policy measures are presented by sector with data in columns showing the magnitude of the estimated greenhouse gas emissions reductions, direct costs or savings of implementation, cost-effectiveness, impacts on gross state product, and employment benefits.

Color key:

	ESD = Energy Supply and Demand for Heat and Power
	AFW = Agriculture, Forestry, and Waste Management
	TLU = Transportation and Land Use

NOTE. Negative numbers in Table indicate cost savings

Summary of Florida Climate Action Plan Recommended Policies

FL CAP Policy #	Policy Recommendation Title	Total 2009–2025 GHG Reductions (MMtCO ₂ e)	Net Policy Cost NPV 2009–2025 (Million \$)	Cost-Effectiveness (\$/tCO ₂ e)	GSP Benefit NPV 2009–2025 (Million\$)	Employment Benefit 2025 (1000s FTE)
ESD-5	Promoting Renewable Electricity through Renewable Portfolio Standard (RPS), incentives and barrier removal (20% by 2020)	319	–\$9,274	–\$29	\$16.22	36.710
ESD-6	Nuclear Power	49.4	\$1,782	\$36	–\$2.48	–7.130
ESD-8	Combined Heat and Power (CHP) Systems	26.5	\$126	\$5	–\$4.21	–11.590
ESD-9	Power Plant Efficiency Improvements	111.4	–\$1,541	–\$14	\$1.70	3.569
ESD-11	Landfill Gas-To-Energy (LFGTE)	64.7	\$79	\$1	\$0.04	0.240
ESD-12	Demand-Side Management (DSM)/Energy Efficiency Programs, Funds, or Goals for Electricity	201.4	–\$8,566	–\$43	\$2.40	8.666
ESD-13a	Energy Efficiency in Existing Residential Buildings	50.4	–\$1,432	–\$28	\$3.08	10.920

Macro Economic Analysis of Florida's Energy and Climate Change Action Plan
April 22, 2009

ESD-14	Improved Building Codes for Energy Efficiency including HB 697 and Executive Order 127	146.4	-\$4,347	-\$30	\$0.46	-0.301
TLU-1	Develop and Expand Low-GHG Fuels	106.41	-\$15,161	-\$142	\$3.83	11.290
TLU-2	Low Rolling Resistance Tires and Other Add-On Technologies	13.99	-\$1,259	-\$90	\$0.16	0.370
TLU-4	Improving Transportation System Management (TSM)	63.91	-\$5,106	-\$80	-\$1.87	-6.701
TLU-8	Increasing Freight Movement Efficiencies	11.52	\$21	\$2	\$0.81	2.283
AFW-1	Forest Retention—Reduced Conversion of Forested to Non-Forested Land Uses	7.2	\$186	\$26	\$0.00	0.308
AFW-2	Afforestation and Restoration of Non-Forested Lands				\$8.04	40.000
	A1. Afforestation	28	\$134	\$5		
	A2. Reforestation	104	\$555	\$5		
	B. Urban Forestry	78	\$759	\$10		
AFW-3	Forest Management for Carbon Sequestration				-\$0.01	0.279
	A. Pine Plantation Management	7.9	\$84	\$11		
	B. Non-Federal Public Land Management	3.9	\$41	\$11		
AFW-4	Expanded Use of Agriculture, Forestry, and Waste Management (AFW) Biomass Feedstocks for Electricity, Heat, and Steam Production	361	\$7,432	\$21	-\$0.71	20.470
AFW-5	Promotion of Farming Practices That Achieve GHG Benefits				\$0.05	0.142
	A. Soil Carbon Management	8	-\$74	-\$9		
	C. Nutrient Management	2.6	\$68	\$26		

AFW-6	Reduce the Rate of Conversion of Agricultural Land and Open Green Space to Development	4.2	\$394	\$93	\$0.26	5.133
AFW-7	In-State Liquid/Gaseous Biofuels Production	68	-\$532	-\$8	\$4.07	7.447
AFW-8	Promotion of Advanced Municipal Solid Waste (MSW) Management Technologies (Including Bioreactor Technology)	34	\$294	\$9	\$0.23	0.645
AFW-9	Improved Commercialization of Biomass-to-Energy Conversion and Bio-Products Technologies				\$1.22	6.440
	A. Manure Digestion/Other Waste Energy Utilization	0.8	-\$13	-\$17		
	B. WWTP Biosolids Energy Production & Other Biomass Conversion Technologies	42	\$1,848	\$44		
	C. Bio-Products Technologies and Use	2.6	-\$161	-\$62		
Summation Total*		1,917	-\$33,663		\$33.31	129.210
Simultaneous Total		1,548	-\$28,569	-\$18	\$37.90	148.300

FL = Florida; CAP = Climate Action Plan; GHG = greenhouse gas; MMTCO₂e = million metric tons of carbon dioxide equivalent; NPV = net present value; \$/tCO₂e = dollars per metric ton of carbon dioxide equivalent; GSP = gross state product; FTE = full-time equivalent; HB = House bill; WWTP = wastewater treatment plant; ESD = energy supply and demand; TLU = transportation and land use; AFW = agriculture, forestry and waste management.

NOTE. Negative numbers indicate savings.