Projected Impacts of Proposed Federal Renewable Portfolio Standards on the Florida Economy

Final Report to

Bipartisan Policy Center

by

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BIOBASED ENERGY ANALSYIS GROUP

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Executive Summary

The purpose of this study is to project how meeting proposed Federal Renewable Energy Portfolio Standards might impact the Florida economy. The two proposals considered are the 25% RES and the 20% RES.

Projections of future electricity demands and renewable energy requirements under each of the two policy scenarios were used to project the amounts of renewable energy that would need to be generated. Once projections of renewable energy requirements for the state were made, the type and number of facilities required to meet these energy needs was projected. Renewable energy technologies were assessed to determine their ability to contribute to meeting the additional renewable energy requirements given the resource base of Florida. The expenditures on construction of additional renewable energy facilities and recurring operating expenditures on inputs to renewable energy generation were then used to project the economic impacts of meeting the additional renewable energy requirements. A regional input/output model, IMPLAN, is used to project the economic impacts from expenditures by the renewable electricity industry both statewide and by BEA regions. Economic impacts from the renewable electricity generation, renewable electricity feedstock production, such as dedicated energy crops, and from electricity rate per kWh changes are projected. Renewable energy sources projected include solar utility scale; solar residential scale; landfill gas; gasification of metropolitan solid wastes; co-fire with wood solids; direct fire of dedicated energy crops, wood, and agricultural wastes, such as citrus wastes or broiler litter; and digestion of layer and dairy wastes. In 2015, the projected requirements under the 25% RES are 11.9 billion kWh and and14.7 billion kWh for the 20% RES. For 2025, the projected requirements under the 25% RES are 48.6 billion kWh and under the 20% RES are 42.9 billion kWh. The projected net generation from renewable energy in the state is 11.52 billion kWh in 2015 and 24.79 in 2025 (Table ES.1).

Statewide, the projected 2025 Total Industry Output (TIO) from operating additional renewable facilities is $11.2 billion under the federal policy proposals (Table ES.2). The Miami Region is projected to experience the greatest addition to economic activity, with the Orlando Region second, and the Sarasota Region third. The largest annual operating economic impacts are projected to be derived from gasification of metropolitan solid waste followed by direct fired dedicated energy crops.

If developed, the annual impacts from dedicated energy crop production and collection of agricultural wastes for energy conversion are estimated at $819 million in 2025. The Orlando and Gainesville Regions are projected receive the greatest agricultural impacts from development of the bioenergy sector.

Although there are negative household income impacts from increased electricity prices, the overall net economic impacts from the additional renewable electricity industry are still positive. The total impact of the two scenarios is positive for the state and within each BEA region of the state. The net projected economic impact exceed $9 billion in 2025 under both policy scenarios.

Table ES.1. Summary Electricity Production by Projected Energy Source for Florida, 2015 and 2025

Variable	2015		2025	
	20% RES Federal	25% RES Federal	20% RES Federal	25% RES Federal
Total Electricity Generation[a]	240.1	239.4	271.70	274.59
Total Renewable Generation	11.52	11.52	24.79	24.79
Municipal Waste:				
Landfill	0.27	0.27	0.27	0.27
MSW	3.83	3.83	10.10	10.10
Co-fire:				
Wood	0.85	0.85	0.85	0.85
Dedicated Energy Crops	0.00	0.00	0.00	0.00
Manure	0.00	0.00	0.00	0.00
Digester:				
Poultry	0.00	0.00	0.00	0.00
Dairy	0.03	0.03	0.03	0.03
Direct Fire:				
Wood	1.93	1.93	1.93	1.93
Dedicated Energy Crops	0.94	0.94	6.98	6.98
Citrus	1.93	1.93	1.93	1.93
Broiler	0.20	0.20	0.20	0.20
Solar:				
Non Industrial	0.24	0.24	0.58	0.58
Industrial	1.30	1.30	1.91	1.91

In 2007, Florida consumed 225 billion kWh of electricity. This is projected to be 245 billion kWh in 2015 and 286 billion kWh in 2025. Sales projections are based on EIA projections.
[a]Overall net generation values are adjusted for the ability to use energy savings to meet the RES.

Table ES.2. Summary of the Projected Economic Impacts for Florida, 2015 and 2025[a]

	2015		2025	
Variable	25% RES	20% RES	25% RES	20% RES
	million dollars			
Total Industry Output:				
Operating	4,939.5	4,941.0	11,173.6	11,174.1
Household	(967.1)	(1,042.5)	(2,961.0)	(2,806.0)
Agriculture and Forestry:				
Direct	204.1	204.1	447.1	447.1
Total	373.6	373.6	818.9	818.9
Investment Impacts[b]	16,660.7	16,662.8	5,277.4	5,277.4
Employment Impacts:				
Operating	19,025.0	19,027.0	42,800.0	42,802.0
Investment	103,444.0	103,457.0	29,724.0	29,724.0
Projected change in energy price (cents/kWh)	0.0044	0.0047	0.0115	0.0109

[a] Does not include cost impact on price of energy saving technologies
[b] Investment impacts are one time impacts and for 2015 take place during the 2010-2015 time period and for 2025 take place between the 2021-2025 time period

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Projected Impacts of Proposed Federal Renewable Energy Portfolio Standards on the Florida Economy

Study Purpose

The purpose of this study is to project how meeting proposed Federal Renewable Energy Portfolio Standards might impact the Florida economy. The two proposals analyzed, which will be discussed later in this document, are the 25% RES and the 20% RES. To conduct the analysis, these two proposed Federal Renewable Energy Portfolio Standards are compared with Florida' existing and planned renewable energy generation. Changes from projected renewable energy generation to amounts required meet the proposed Federal standards are estimated. Renewable energy technologies are assessed to determine their ability to contribute to meeting the additional renewable energy requirements given the resource base of Florida. The investment expenditures on construction of additional renewable energy facilities and recurring operating expenditures on inputs to renewable energy generation are then used to project the economic impacts of meeting the additional renewable energy requirements. These impacts are projected for the state and for Bureau of Economic Analysis (BEA) regions within the state (Figure 1).

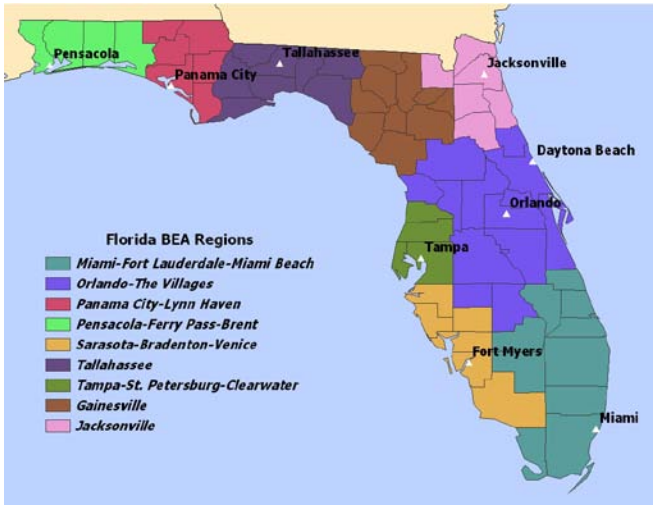


Figure 1. Florida Modified Bureau of Economic Analysis Regions

Methods of Analysis

In this analysis, projections of renewable energy requirements for the state of Florida will be made for two policy scenarios: 1) the 20% RES and 2) the 25% RES. Once projections of renewable energy requirements for the state are made, the type and number of facilities required to meet these energy needs must be determined. The number and type of facilities are determined not only at the state level, but also at the Bureau of Economic Analysis (BEA) region level.

The number and type of facilities in each BEA region are determined based upon plans for facility construction or the potential for facilities based on resources in the region. For example, co-fire of dedicated energy crop conversion facilities are placed in BEA regions according to location of current crop production. Because in many cases, the sizes and technologies of facilities that might be placed in a region are unknown, representative technologies and sizes for facilities that be placed in a region are assumed. These sizes and technologies are selected based upon previous literature and availability of engineering cost data.

Costs, facility sizes, and input requirements for representative renewable energy technologies are then used to project required facility expenditures. Descriptions of the representative technologies are in Appendix B of this document. The costs and prices presented

in the tables in Appendix B are all in $2006. A regional input/output model, IMPLAN (Olson and Lindall, 1999) is used to project the economic impacts from expenditures by the energy conversion facilities both statewide and by BEA regions. Impacts from the various technologies differ depending on the pre-specified demand for that technology, the capital costs involved, and the operating costs. The dollar value projections presented in the document from the IMPLAN model are all in $2009.

The IMPLAN model results presented include estimates of Total Industry Output (TIO), Employment, and Value-Added. Total Industry Output, a measure of economic activity, is defined as the value of production by industry per year. Employment represents total wage and salary employees, as well as self-employed jobs in a region, for both full-time and part-time workers. Total Value-added is defined as all income to worker paid by employers; self-employed income; interests, rents, royalties, dividends, and profit payments; and excise and sales taxes paid by individuals to businesses. The IMPLAN results presented include both direct and total impacts. Direct effects measure the response for a given industry given a change in final demand for that same industry. Indirect effects represent the response by all local industries from a change in final demand for a specific industry. Induced effects represent the response by all local industries caused by increased (decreased) expenditures of new household income and inter-institutional transfers generated (lost) from the direct and indirect effects of the change in final demand for a specific industry. Total effects are the sum of direct, indirect, and induced effects. For purposes of brevity, only direct and total effects are presented.

The operating costs for the various technologies shown in Appendix B are used to generate "breakeven" prices for each technology. The breakeven price for each technology is then weighted by projected electricity sales from that technology to arrive at an overall weighted renewable electricity price. The difference between the electricity prices with the additional renewable energy under the two federal proposals and without the additional renewable energy are assumed to be passed on to consumers either directly through changes in electricity rates or indirectly through rate increases to commercial users that then pass on these costs to consumers through increases in prices of goods and services. The household incomes of consumers in the IMPLAN model were then impacted by this overall amount.

The analysis in this document will be as follows. First, the requirements under the proposed federal renewable portfolio and energy efficiency savings (the 20% RES and the 25% RES's) policies will be presented. Second, an energy profile of Florida will be presented. Third, the state's energy situation by potential source of renewable energy will be analyzed, including assessment of potential for feedstocks to supply sufficient energy. Fourth, projections of Florida' renewable energy demand under the under the 20% RES and the 25% RES will be presented. Fifth, the economic impacts of meeting the renewable energy requirements under the policy scenarios will be projected.

The Proposed Federal Renewable Portfolio Standards and Federal Energy Savings Requirements

Two proposals have been put forward regarding federal energy standards. The first is for a federal renewable energy portfolio standard. The second proposes energy savings requirements for utilities and a renewable energy portfolio standard.

The 20% RES

The proposed new PURPA Section 610-Federal Renewable Portfolio Standard made by the Bingaman Proposal , or the 20% RES, would require that electric utilities obtain certain percentages of their sales of electricity to consumers from new renewable energy, existing renewable energy, or energy efficiency (Summary of Bingaman Discussion Draft, 2009). These percentages are as shown in Table 1.

Eligible sources include solar, wind, ocean or geothermal energy, biomass, landfill gas, or incremental hydropower. The proposed means of compliance are that the electric utility will submit renewable energy credits, federal energy efficiency credits, or alternative compliance payments. Federal energy efficiency credits cannot be used to meet more than 25% of the requirement. The required percentages shown in Table 1 are adjusted by 25% energy efficiency credits, with these adjusted values shown in the far right column. The alternative compliance payments are at a rate of 3 cents per kWh.

Table 1. Proposed Federal RPS Annual Renewable Energy Percentage Requirement Under the New PURPA Section 610 by 20% RES (the 20% RES)

Year	Required Annual Percentage of Sales	Required Annual Percentage Adjusted for Energy Efficiency Credits
2011-2012	4.0	3.0
2013-2015	8.0	6.0
2016-2018	12.0	9.0
2019-2020	16.0	12.0
2021-2039	20.0	15.0

The 25% RES

The second proposal is an energy savings act coupled with a renewable energy portfolio standard, termed the "Save American Energy Act" (Save American Energy Act, 2009) and the "American Renewable Energy Act" (American Renewable Energy Act, 2009) respectively. This set of proposals was made Markey (the 25% RES) to amend PURPA. The "Save American Energy Act" would require nationwide minimal levels of electricity and natural gas savings to be obtained through utility efficiency programs, building energy codes, appliance standards, and related efficiency measures (Save American Energy Act, 2009). The performance standards as they relate to retail electricity distributors are shown in Table 2.

The "American Renewable Energy Act" requires the following annual percentages of renewable energy displayed in Table 3. The percentage may be met by submitting the Federal renewable energy credit or an alternative compliance payment. The payment is equal to the lesser of 200% of the Federal renewable electricity credit for the previous compliance year or 5 cents adjusted by the Gross Domestic Product Implicit Price Deflator. The proposed Act treats wind, solar, geothermal, biomass or landfill gas, qualified hydropower, and marine or hydrokinetic renewable energy as qualified renewables.

The Department of Energy, Energy Information Administration (EIA) conducted an analysis of the 25% RES for a federal renewable energy portfolio (EIA, 2009). The percentages projected by EIA, given exclusion of small power retailers, hydro sales, municipal solid waste (MSW) sales, and energy efficiency credits, are shown in Table 4.

Table 2. Proposed Electricity Savings Requirements for Retail Electricity Distributors Under the "Save American Energy Act" (the 25% RES)

Year	Cumulative Electricity Savings Percentage
2012	1.00
2013	2.00
2014	3.25
2015	4.50
2016	6.00
2017	7.50
2018	10.00
2019	12.50
2020	15.00

Table 3. Proposed Annual Renewable Energy Percentage Requirement Under the "American Renewable Energy Act" (the 25% RES)

Year	Required Annual Percentage
2012-2013	6.00
2014-2015	8.50
2016-2017	11.00
2018-2019	14.00
2020-2021	17.50
2022-2023	21.00
2024	23.00
2025	25.00

Table 4. The 25% RES for Federal Renewable Energy Portfolio Standard: Analysis by the Energy Information Administration

		Annual Percentage Excluding:		
Calendar Year	Required in Proposed Law	Small Power Retailers	Small Power Retailers, Hydro Sales, and MSW Sales	Sm. Power Retailers, Hydro and MSW Sales, and States Taking Allowable Energy Effic. Credits
			Percent	
2012	6.0	5.3	5.0	3.4
2013	6.0	5.3	5.0	3.4
2014	8.5	7.5	7.1	4.9
2015	8.5	7.5	7.1	4.9
2016	11.0	9.7	9.2	6.3
2017	11.0	9.7	9.2	6.3
2018	14.0	12.3	11.8	8.0
2019	14.0	12.3	11.8	8.0
2020	17.5	15.4	14.7	10.0
2021	17.5	15.4	14.7	10.0
2022	21.0	18.5	17.6	12.0

Table 4. The 25% RES for Federal Renewable Energy Portfolio Standard: Analysis by the Energy Information Administration

Calendar Year	Required in Proposed Law	Annual Percentage Excluding: Small Power Retailers	Small Power Retailers, Hydro Sales, and MSW Sales	Sm. Power Retailers, Hydro and MSW Sales, and States Taking Allowable Energy Effic. Credits
2023	21.0	18.5	17.6	12.0
2024	23.0	20.2	19.3	13.1
2025	25.0	22.0	21.0	17.0

(Source: EIA, 2009).

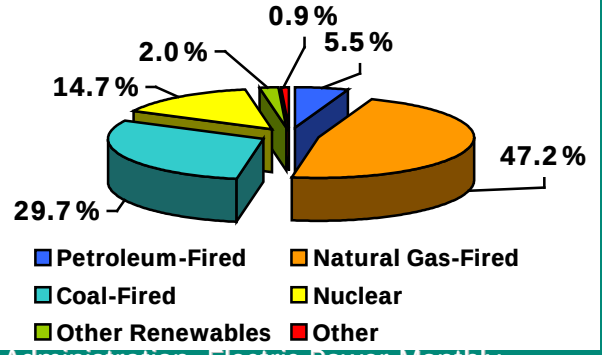
Florida's Current Energy Profile

Florida's net electricity generation for 2008 was 219.3 million MWh (Table 5). Florida's current energy portfolio is currently heavily reliant upon natural gas and coal-fired electricity. Based upon 2008 data, about 47 percent comes from natural gas and about 28 percent comes from coal-fired (Figure 1). Non-hydroelectric renewables account for just over four percent.

Table 5. Florida Net Electricity Generation, 2008

	Million MWh
Total Net Electricity Generation	219.3
By Source:	
Petroleum-Fired	12.0
Natural Gas-Fired	103.4
Coal-Fired	65.1
Nuclear	32.3
Other Renewables	4.3
Other	2.0

Figure 2. Sources of Net Electricity Generation, 2008



Source: Department of Energy, Energy Information Administration, Electric Power Monthly

Renewable Electricity Generators

Facilities using renewable sources to produce energy had a total of 1,523.7 MW of nameplate capacity as of 2007. Currently, Florida's renewable electricity generation is derived from a variety of sources including biomass from wood solids and agricultural wastes, metropolitan solid waste, and landfill gas. The names, locations, energy sources, and nameplate capacities of facilities using wind are displayed in Table 6, while planned facilities are shown in Table 7. Figure 3 shows a map of the existing and planned renewable facilities as of May 2009. Planned facilities include additional biomass use and large scale solar projects.

Table 6. Florida Electricity Generation Facilities Using Renewable Energy, 2007

Utility Name	Plant Name	City	Zip	Nameplate Capacity	Energy Sources				
Bay County Board-County Comm	Bay Resource Management Center	Panama City	32404	13.6	MSW				
Bio-Energy Partners	CSL Gas Recovery	Pompano Beach	33073	3	LFG				
Bio-Energy Partners	CSL Gas Recovery	Pompano Beach	33073	3	LFG				
Bio-Energy Partners	CSL Gas Recovery	Pompano Beach	33073	3	LFG				
Bio-Energy Partners	CSL Gas Recovery	Pompano Beach	33073	2.2	LFG				
Buckeye Florida Ltd Partners	Buckeye Florida LP	Perry	32347	8.2	BLQ	WDS	RFO	NG	OBG
Buckeye Florida Ltd Partners	Buckeye Florida LP	Perry	32347	10.4	BLQ	WDS	RFO	NG	OBG
Buckeye Florida Ltd Partners	Buckeye Florida LP	Perry	32347	14.8	BLQ	WDS	RFO	NG	OBG
Buckeye Florida Ltd Partners	Buckeye Florida LP	Perry	32347	11	BLQ	WDS	RFO	NG	OBG
Covanta Lake Inc	Covanta Lake County Energy	Okahumpka	34762	15.5	MSW				
Gainesville Regional Utilities	South West Landfill	Archer	32618	0.8	LFG				
Gainesville Regional Utilities	South West Landfill	Archer	32618	0.8	LFG				
Gainesville Regional Utilities	South West Landfill	Archer	32618	0.8	LFG				
Georgia Pacific Corp - Palatka	Georgia Pacific Palatka Operations	Palatka	32177	9.7	BLQ				
Georgia Pacific Corp - Palatka	Georgia Pacific Palatka Operations	Palatka	32177	14	BLQ				
Georgia Pacific Corp - Palatka	Georgia Pacific Palatka Operations	Palatka	32177	47.8	BLQ				
Georgia Pacific Corp - Palatka	Georgia Pacific Palatka Operations	Palatka	32177	32	BLQ				
Hillsborough County	Hillsborough County Resource Recovery	Tampa	33619	29	MSW				
International Paper Co-Pensacola	International Paper Pensacola	Cantonment	32533	39.6	BLQ	WDS	BIT	NG	LFG
International Paper Co-Pensacola	International Paper Pensacola	Cantonment	32533	43.2	BLQ	WDS	BIT	NG	LFG
JEA	Girvin Landfill	Jacksonville	32225	3	LFG				
Jefferson Smurfit Corp	Jefferson Smurfit Fernandina Beach	Fernandina Beach	32034	44	WDL	RFO	WDS	BLQ	BIT
Jefferson Smurfit Corp	Jefferson Smurfit Fernandina Beach	Fernandina Beach	32034	74.4	BIT	RFO	WDS	BLQ	
Lee County Board-Commissioners	Lee County Solid Waste Energy	Fort Myers	33905	39	MSW	WO			
Lee County Board-Commissioners	Lee County Solid Waste Energy	Fort Myers	33905	20	MSW	WO			
Miami Dade Water & Sewer Auth	Central District Wastewater Treat Plant	Key Biscoque	33131	1.2	OBG	NG			
Miami Dade Water & Sewer Auth	Central District Wastewater Treat Plant	Key Biscoque	33131	1.2	OBG	NG			
Miami Dade Water & Sewer Auth	Central District Wastewater Treat Plant	Key Biscoque	33131	1.2	OBG	NG			
Miami Dade Water & Sewer Auth	Central District Wastewater Treat Plant	Key Biscoque	33131	1.2	OBG	NG			
Miami Dade Water & Sewer Auth	South District Wastewater Treatment Plt	Miami	33190	0.9	OBG	NG			
Miami Dade Water & Sewer Auth	South District Wastewater Treatment Plt	Miami	33190	0.9	OBG	NG			
Miami Dade Water & Sewer Auth	South District Wastewater Treatment Plt	Miami	33190	0.9	OBG	NG			
Minnesota Methane LLC	Volusia Landfill Gas Utilization Project	Daytona Beach	32128	1.9	LFG				

Table 6. Continued

Utility Name	Plant Name	City	Zip	Nameplate Capacity	Energy Sources				
Minnesota Methane LLC	Volusia Landfill Gas Utilization Project	Daytona Beach	32128	1.9	LFG				
Montenay Power Corp	Miami Dade County Resource Recovery Fac	Miami	33178	38.5	MSW	PG			
Montenay Power Corp	Miami Dade County Resource Recovery Fac	Miami	33178	38.5	MSW	PG			
New Hope Power Partnership	Okeelanta Cogeneration	South Bay	33493	74.9	AB	WDS	DFO	NG	
New Hope Power Partnership	Okeelanta Cogeneration	South Bay	33493	54	AB	WDS	DFO		
Pasco County	Pasco Cnty Solid Waste Resource Recovery	Spring Hill	34610	31.2	MSW				
Plummer Forest Products Inc	Rayonier Fernandina Mill	Fernandina Beach	32034	7.5	WDS	RFO	TDF		
Plummer Forest Products Inc	Rayonier Fernandina Mill	Fernandina Beach	32034	20	WDL	RFO			
SI Group Energy LLC	SI Group Energy LLC	Monticello	32344	7.5	WDS	AB			
Solid Waste Auth of Palm Beach	North County Regional Resource	West Palm Beach	33412	62.3	MSW				
Stone Container Corp-Panama Ci	Stone Container Panama City Mill	Panama City	32401	4	BLQ	RFO	NG		
Stone Container Corp-Panama Ci	Stone Container Panama City Mill	Panama City	32401	10	BLQ	RFO	NG		
Stone Container Corp-Panama Ci	Stone Container Panama City Mill	Panama City	32401	20	WDS	BIT	RFO	NG	
Tampa Wastewater Department	Howard F Curren Advncd Wastewater Plant	Tampa	33605	0.5	OBG				
Tampa Wastewater Department	Howard F Curren Advncd Wastewater Plant	Tampa	33605	0.5	OBG				
Tampa Wastewater Department	Howard F Curren Advncd Wastewater Plant	Tampa	33605	0.5	OBG				
Tampa Wastewater Department	Howard F Curren Advncd Wastewater Plant	Tampa	33605	0.5	OBG				
Tampa Wastewater Department	Howard F Curren Advncd Wastewater Plant	Tampa	33605	0.5	OBG				
Telogia Power LLC	Telogia Power	Telogia	32360	14	WDS	AB			
United States Sugar Corp	Clewiston Sugar House	Clewiston	33440	21.6	AB	DFO			
United States Sugar Corp	Clewiston Sugar House	Clewiston	33440	15	AB	DFO			
United States Sugar Corp	Clewiston Sugar House	Clewiston	33440	20	AB	DFO			
United States Sugar Corp	Clewiston Sugar House	Clewiston	33440	14	AB	DFO			
US Operating Services Company	Cedar Bay Generating Company LP	Jacksonville	32218	291.6	BIT	WDS			
Veolia ES Pinellas Inc	Pinellas County Resource Recovery	St. Petersburg	33716	50.5	MSW				
Veolia ES Pinellas Inc	Pinellas County Resource Recovery	St. Petersburg	33716	26	MSW				
Wheelabrator Environmental Systems	McKay Bay Facility	Tampa	33605	22.1	MSW				
Wheelabrator Environmental Systems	Wheelabrator South Broward	Ft Lauderdale	33314	66	MSW				
Wheelabrator Environmental Systems	Wheelabrator North Broward	Pompano Beach	33073	67.6	MSW				
Wheelabrator Environmental Systems	Wheelabrator Ridge Energy	Auburndale	33823	45.5	WDS	TDF	LFG		
WM Renewable Energy LLC	Springhill Gas Recovery	Cambellton	32426	0.8	LFG				
WM Renewable Energy LLC	Springhill Gas Recovery	Cambellton	32426	0.8	LFG				
WM Renewable Energy LLC	Springhill Gas Recovery	Cambellton	32426	0.8	LFG				
WM Renewable Energy LLC	Springhill Gas Recovery	Cambellton	32426	0.8	LFG				

Table 6. Continued

Utility Name	Plant Name	City	Zip	Nameplate Capacity	Energy Sources				
WM Renewable Energy LLC	Springhill Gas Recovery	Cambellton	32426	0.8	LFG				
WM Renewable Energy LLC	Springhill Gas Recovery	Cambellton	32426	0.8	LFG				
(Source: EIA, 2009)									

Figure 3. Existing and Proposed Renewable Energy Projects

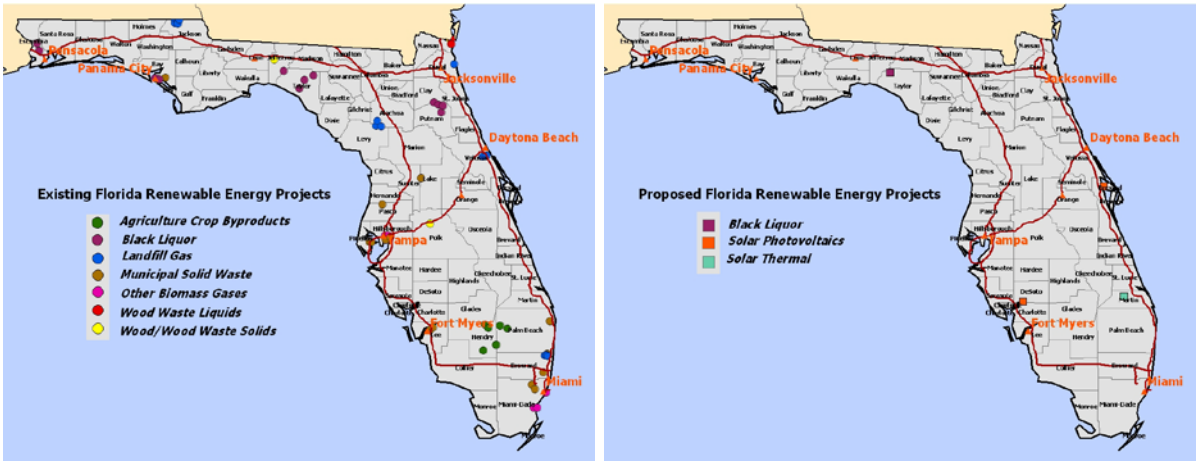


Table 7. Proposed Florida Electricity Generation Facilities Using Renewable Energy, 2007

Utility Name	Plant Name	City	Zip	Name-plate Capacity	Energy Sources	Projected Year Online
Florida Power & Light Co	Buckeye Florida LP	Perry	32347	15	BLQ, WDS, RFO, NG, OBG	2010
Florida Power & Light Co	Space Coast Solar Energy	Kennedy Space Center	32815	10	SUN (Solar PV)	2010
Florida Power & Light Co	Martin	Indiantown	34956	75	SUN (Solar Thermal)	2009
Florida Power & Light Co	Desoto Solar Energy	Desoto County		25	SUN	2009

(Source: EIA, 2009)

Potential for Energy Generation to Meet Renewable Energy Requirements

Several sources are candidates for renewable energy in Florida. Potential sources include solar utility scale, solar residential scale, landfill gas, gasification of metropolitan solid wastes, co-fire with wood solids, direct fire of dedicated energy crops, wood, and agricultural wastes, such as citrus wastes or broiler litter, and digestion of layer and dairy wastes.

Solar

While the Southwest has the greatest solar PV energy potential, Florida follows closely with 85% of the maximum PV resource of any location in the United States (Florida Solar Energy Center, 2007). The map in Figure 4 illustrates Florida's solar photovoltaic potential. The state has a rebate of up to $20,000 for home applications of solar PV and up to $100,000 for commercial applications.

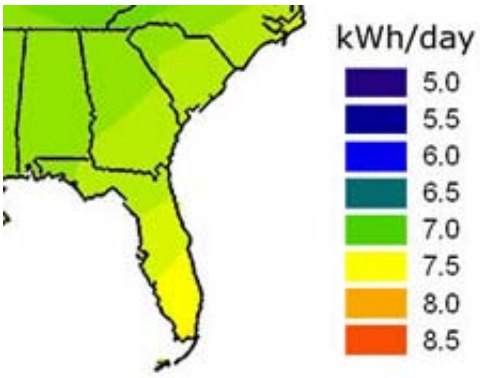


Figure 4. Florida Solar PV Potential
(Source: Florida Solar Energy Center)

Shown in Table 8, several utility solar energy projects have been proposed for Florida. These projects would total 110 MW of capacity for a projected electricity generation of 213 million kWh. Two of the proposed projects are photovoltaic and the third is solar thermal. Possible plans to build a fourth site in Charlotte County (Babcock Ranch) that would be 75 MW capacity of photovoltaic solar have been announced (Patel, 2009). Assuming a 19% capacity factor, if constructed, this would provide about 124.8 million kWh of electricity per year. Adding this amount to the already planned facilities, the total would be 337.8 million kWh per year.

Table 8. Proposed Utility Scale Solar Projects, Florida

Name of Project	Type of Project	MW Capacity	Type of Generation	MWh's/ Year	Capacity Factor
Martin Solar	Thermal	75	Fuel Substitution, Non-firm	155,000	23.6%
Desoto Solar	PV	25	Added MW, Non-firm (but may supply firm in practice)	42,000	19.4% (if stationary) >19.4% (if tracking)
Space Coast Solar	PV	10	Added MW, Non-firm (but may supply firm in practice)	16,000	18% (stationary)
Total		110		213,000	

(Source: Florida Public Service Commission, 2008)

Landfill Gas

Currently, Florida has about 60.9 MW of electricity capacity from landfill gas. This is enough to produce about 185.6 million kWh of electricity per year. The state also has 13 landfills with at least 2 million tons of waste in place designated as candidate landfills. The total waste in place among these landfills is 88.4 million tons or enough for about 36.0 MW of capacity (269.7 million kWh of electricity per year).[1] Table 9 provides a listing of operational, candidate, and potential projects.

Table 9. Florida Landfill Gas Projects, Candidate, and Potential Landfills

Landfill Name	Landfill City	Landfill County	Waste In Place (tons)	Project Status	MW Capacity
Baseline Landfill	Ocala	Marion	3,432,000	Operational	3.2
Brevard County Central Disposal Facility	Cocoa	Brevard	14,665,000	Operational	6.2
Central Disposal SLF	Pompano Beach	Broward	23,288,000	Operational	11.3
Girvin Road LF	Jacksonville	Duval	4,122,058	Operational	0.4
North LF	Jacksonville	Duval	4,900,000	Operational	0.5
Orange County SLF	Orlando	Orange	14,165,000	Operational	12.4
Osceola Road Solid Waste Management Facility	Geneva	Seminole	7,700,000	Operational	6.4
Springhill Regional Landfill	Campbellton	Jackson	3,245,441	Operational	4.8
SW Alachua SLF	Archer	Alachua	2,690,000	Operational	2.4
Tomoka Farms Road LF	Port Orange	Volusia	7,569,140	Operational	3.6
Trail Ridge LF	Baldwin	Duval	4,677,128	Operational	9.6
Medley LF Expansion	Medley	Miami-Dade	18,018,000	Candidate	
South Dade Solid Waste Disposal Facility	Homestead	Miami-Dade	13,918,741	Candidate	
North Dade Landfill	Opa-Locka	Miami-Dade	10,389,168	Candidate	
Southeast Hillsborough County LF	Lithia	Hillsborough	9,500,653	Candidate	
Perdido LF	Cantonment	Escambia	7,580,000	Candidate	
Bee Ridge LF	Sarasota	Sarasota	5,887,963	Candidate	
Naples SLF Collier County	Naples	Collier	4,992,000	Candidate	
PBCSWA RRF Site #7	West Palm Beach	Palm Beach	4,418,356	Candidate	
Indian River County LF Class I	Vero Beach	Indian River	3,279,720	Candidate	
Martin County Palm City II SLF	Palm City	Martin	3,107,821	Candidate	
Bridgeway Acres LF	St. Petersburg	Pinellas	2,850,000	Candidate	
West Nassau SLF	Callahan	Nassau	2,377,000	Candidate	
Gulf Coast LF	Fort Myers	Lee	2,125,340	Candidate	

[1]The EPA Landfill Methane Outreach Program Database of operational facilities in the U.S. has a total of 3766.8 million tons of waste in place for the U.S. with a total of 1531.7 MW capacity. This is an average of .4066 MW of electricity generation capacity per million tons of waste. Using this average, the Florida tons of waste in place in candidate landfills with at least 2 million tons of waste in place is 88.4 million tons or enough for 36.0 MW. With a capacity factor of .856 (See Appendix B, Table B.##), this is a potential generation of about 269.7 million kWh in a year.

Table 9. Florida Landfill Gas Projects, Candidate, and Potential Landfills

Landfill Name	Landfill City	Landfill County	Waste In Place (tons)	Project Status	MW Capacity
Leon County Solid Waste Management Facility	Tallahassee	Leon	1,680,000	Candidate	
Sarasota Central Landfill Complex	Nokomis	Sarasota	1,400,000	Candidate	
Zemel Road Landfill	Punta Gorda	Charlotte	1,145,250	Candidate	
Southport Road SLF Phase I & II	Kissimmee	Osceola	1,029,000	Candidate	
Citrus County Landfill	Lecanto	Citrus	1,000,000	Candidate	
Lee/Hendry County Regional SW Disposal Facility	Labelle	Hendry	1,000,000	Candidate	
New River Regional LF	Raiford	Union		Candidate	
Dyer Boulevard LF	West Palm Beach	Palm Beach	15,598,440	Potential	
Lena Road County LF	Bradenton	Manatee	8,400,000	Potential	
Wright LF	Fort Walton Beach	Okaloosa	6,542,657	Potential	
Hillsborough Heights / Taylor Rd LF	Seffner	Hillsborough	3,436,000	Potential	
Putnam County Central SLF	Palatka	Putnam	3,103,623	Potential	
Sunbeam Road SLF	Jacksonville	Duval	2,250,000	Potential	
Majette North SLF	Panama City	Bay	2,059,200	Potential	
Taylor County Central LF	Perry	Taylor	1,389,682	Potential	
Croom SLF	Brooksville	Hernando	1,215,500	Potential	
Madison City/County SLF	Madison	Madison	950,092	Potential	
Northwest Waste Management Facility	Brooksville	Hernando	950,000	Potential	
Huntington SLF	Crescent City	Putnam	895,573	Potential	
Santa Rosa Central LF	Bagdad	Santa Rosa	806,520	Potential	
Ridge Road LF	New Port Richey	Pasco	680,000	Potential	
Rosemary Hill LF Expansion Class I	Green Cove Springs	Clay	545,688	Potential	
Saint Cloud City LF Class I	Saint Cloud	Osceola	514,800	Potential	
Putnam County Central LF Phase II	Palatka	Putnam	434,720	Potential	
Tillman Ridge SLF	St. Augustine	St. Johns	434,720	Potential	
DeSoto City SLF	Sebring	Highlands	413,432	Potential	
Stock Island LF	Key West	Monroe	343,200	Potential	
KSC/Schwartz Road Landfill Class III (Open)	Kennedy Space Center	Brevard	264,030	Potential	
Aucilla Area SW Facility Class I & 2	Greenville	Madison	204,490	Potential	
Boca Raton Garbage Dump	Boca Raton	Palm Beach		Potential	
Buckingham Landfill	Fort Meyers	Lee		Potential	
Columbia County Central LF	Winfield	Columbia		Potential	
Largo City SLF	Largo	Pinellas		Potential	
Nine Mile Road, Inc.	St. Augustine	St. Johns		Potential	
Sandler Road SLF	Jacksonville	Duval		Potential	
Schwartz Road Landfill Class III (Closed)	Kennedy Space Center	Brevard		Potential	
South Dade Dump	Goulds	Miami-Dade		Potential	

Table 9. Florida Landfill Gas Projects, Candidate, and Potential Landfills

Landfill Name	Landfill City	Landfill County	Waste In Place (tons)	Project Status	MW Capacity
South Dade SW Reduction Facility	Goulds	Miami-Dade		Potential	
Toytown SLF	St. Petersburg	Pinellas		Potential	

Source: EPA, Landfill Methane Outreach Program Database.

Poultry Wastes

Florida has two primary types of poultry operations, broilers and layers. Broiler litter has lower moisture content and might be used in direct combustion, while layer litter has higher moisture content and might be used in on-farm digesters. The broiler and layer numbers by BEA region, along with the estimated kWh that could be derived from each type of poultry manure is shown in Table 10. The region with the largest potential for electricity from poultry waste is the Gainesville Region, with potential for .9 million kWh from digestion of layer litter and 198.6 million kWh from direct fire of broiler litter.

Table 10. Projected Potential for Electric Generation from Poultry Wastes, Florida

BEA	Number of Layers	Estimated kWh/year[a]	Number of Broilers	Estimated kWh/year[b]
Miami-Fort Lauderdale-Miami Beach	14,272	50,009		
Orlando-The Villages	20,817	72,943		
Panama City-Lynn Haven	8,163	28,603	3,238,020	11,346,022
Pensacola-Ferry Pass-Brent	2,619	9,177	3,124,261	10,947,411
Sarasota-Bradenton-Venice	12,595	44,133		
Tallahassee	1,561	5,470	6,328,438	22,174,847
Tampa-St. Petersburg-Clearwater			5,174	18,130
Gainesville	251,526	881,347	56,686,041	198,627,888
Jacksonville	6,001	21,028		
Florida	**317,554**	**1,112,709**	**69,381,934**	**243,114,297**

[a] The estimate of kWh per layer is .0096 per day (Source: California Energy Commission Website, Renewable Energy Research).

[b] The estimate of kWh per broiler .0068 per day (Source: California Energy Commission Website Renewable Energy Research).

Dairy Manure

Electricity from dairy manure can be produced from on-farm digester systems. Florida has just under 88,000 dairy cows. The majority of these dairy cows are located in the Miami-Fort Lauderdale-Miami Beach and Gainesville Regions. The dairy cattle in these two regions have the potential to produce about 27.3 million kWh of electricity (See Table 11).

Table 11. Projected Potential for Electric Generation from Dairy Wastes, Florida

BEA	Number of Milk Cows	Estimated kWh/year[a]
Miami-Fort Lauderdale-Miami Beach	24,757	11,205,018
Orlando-The Villages	12,161	5,504,069
Sarasota-Bradenton-Venice	10,755	4,867,713
Tampa-St. Petersburg-Clearwater	4,571	2,068,835
Gainesville	35,558	16,093,551
Total	**87,802**	**39,739,185**

[a] The estimate of kWh per dairy cow is 1.24 per day (Source: California Energy Commission Website, Renewable Energy Research).

Co-Fire With Wood

Florida's coal-fired plants have the potential for co-firing biomass, such as wood wastes, agricultural wastes, or dedicated energy crops, such as elephant grass. In total, Florida has coal-fired plants with a total of 8196.2 MW capacity. Smaller plants (<200 MW capacity) not already using biomass in co-fire might be additional candidates for co-firing. A listing of the coal-fired plants that are less than 200 MW and are not currently using wood or other biomass is shown in Table 12. These facilities might serve as candidates for co-firing biomass at a rate up to 15%. Shown in Table 12, the total capacity of these facilities is 934 MW. If co-firing at a 15% rate, this is 140.1 MW of potential co-firing capacity or enough to generate 981.8 million kWh from co-firing (assumes an 80% capacity factor). Co-firing at this rate would require about 465,293

Table 12. Electricity Generators Using Bituminous Coal Less than 200 MW Capacity, Florida, 2007

Utility Name	Plant Name	City	Zip	Nameplate Capacity
Gulf Power Co	Scholz	Sneeds	32460	49
Gulf Power Co	Crist	Pensacola	32514	93.7
Central Power & Lime Inc	Central Power & Lime	Brooksville	34605	125
Tampa Electric Co	Polk	Mulberry	33860	133.4
Gulf Power Co	Lansing Smith	Southport	32409	149.6
Gulf Power Co	Lansing Smith	Southport	32409	190.4
Tampa Electric Co	Polk	Mulberry	33860	192.9
			Total	934.0

(Source: Energy Information Administration)

dry tons of wood residues (using 9000 BTU per ton of dry softwood and 80% capacity factor). The potential co-firing capacity lies in the Orlando, Panama City, Penscacola, and Tampa BEA Regions.

Using supply functions from a prior study (English et al., 2006), the projected supplies of wood residues available at various prices from Florida were calculated. These are shown in Figure 5, with residues being supplied beginning at around $20 per ton. The price $60 per ton was used for all three periods in this analysis. At $60 per ton, in 2025, 1.5 million dry tons are projected to be available. This amount exceeds the 465 thousand tons required for co-firing discussed above. A breakdown of residues available in each BEA region is shown in Table 13. Each of the BEA regions that had potential for co-firing are projected to have sufficient wood

residues with the exception of the Orlando and Tampa Regions. The Tampa Region has significantly less wood residues than co-firing capacity. Therefore, that facility would likely not co-fire wood residues. The Orlando Region has nearly enough wood residues too satisfy 15% co-firing. If the Tampa Region facility is omitted, the wood residue requirements would be 403,022 tons.

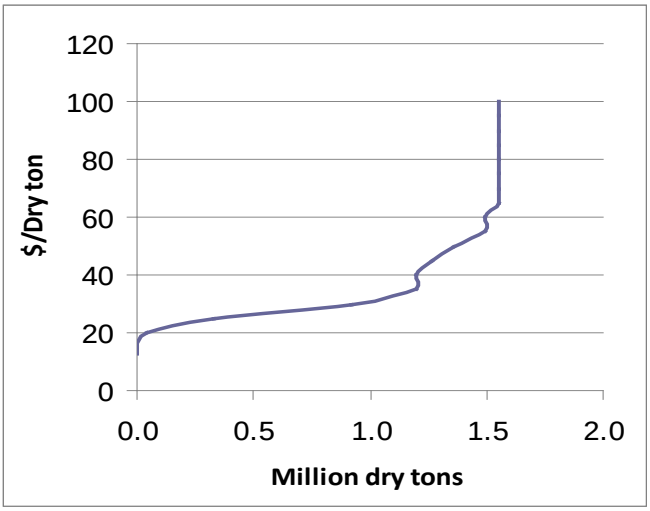


Figure 5. Estimated Wood Residue Supply Curve, Florida, 2025

Direct Fire with Wood

While wood can be co-fired with coal, it can also be fired directly for energy. As stated in the co-fire section above, Florida is projected to have greater wood residue resources at $60 per ton that could be used in the potential coal plants for co-firing. While co-firing was projected to use 403,022 tons, the state is projected to have over 1.5 million tons. Therefore, additional wood residues at that price would potentially be available for direct fire. As can be seen in the Appendix B, a direct fire facility that produces 175.2 million kWh of electricity requires about 83,029 tons of wood residues per year. The tons of residues for regions with significant wood residues available for direct fire are Gainesville 415,178 tons, Jacksonville 219,173 tons, and Tallahassee 389,642 tons.

Table 13. Projected Tons of Wood Residues Available at $60/Ton, by BEA Region, Florida, 2025

BEA	Tons of Residues	Share
Gainesville	415,178	0.267271
Jacksonville	219,173	0.141093
Miami-Fort Lauderdale-Miami Beach	4,320	0.002781
Orlando-The Villages	145,804	0.093861
Panama City-Lynn Haven	250,179	0.161053
Pensacola-Ferry Pass-Brent	113,096	0.072806
Sarasota-Bradenton-Venice	1,207	0.000777
Tallahassee	389,642	0.250832
Tampa-St. Petersburg-Clearwater	14,798	0.009526
Statewide	1,553,396	

These amounts of residues are sufficient for five direct fire facilities in the Gainesville Region, two in the Jacksonville Region, and four in the Tallahassee Region. Altogether these eleven facilities could produce 1,927.2 million kWh of electricity per year.

Direct Fire With Dedicated Energy Crops

The potential for dedicated energy crop production will likely be based on the amount of cropland/pastureland that can be converted. In addition, the price of that feedstock will likely be related to quantities demanded. As estimates for these data, a solution from POLYSYS from a prior study is used (English et al., 2006). From this analysis, there are 0.5 million tons of dedicated energy crop estimated to be available in 2015, 2.3 million in 2020, and 3.7 million in 2025. Acreage yields used in the analysis are 3.6, 6.2, and 7.0 tons per acre, respectively, over the same period. The price per ton for dedicated energy crops in Florida ranged from $65 to $75 per ton. The price $70 per ton was used for all three periods in this analysis. With 3.7 million tons of dedicated energy crop in 2025, about 6,975 million kWh of electricity could be produced from dedicated energy crops.

Metropolitan Solid Waste

Another potential source of biopower is gasification using municipal solid waste (MSW). In order to determine the electricity generation potential of MSW, the amount of MSW generated needs to be determined. The amount of MSW generated will be determined by the feasibility of collection and conversion, the population level, and the government focus on reducing MSW into landfills.

Florida generated 35.02 billion tons of municipal solid waste in 2006 or 1.912 pounds per capita. Of that, 2.1 billion tons were already used to create energy, 22.75 billion tons are landfilled (1.242 billion tons), and the remainder already recycled (Florida Department of Environmental Protection, 2007). Furthermore, the Energy, Climate Change, and Economic Security Act of 2008 (House Bill 7135) signed into law by Governor Crist established a new statewide recycling goal of 75% to be achieved by the year 2020 (Florida Department of Environmental Protection, 2009).

Therefore, Florida has a goal of reducing landfilled MSW from where it is today to 25% or 8.75 times billion tons by 2020 not adjusting for increased population growth. Assuming this reduction moves into the refuse derived fuel (RDF) stream, 13.99 billion tons would be converted to RDF. A plant creating RDF will likely convert 75 to 85% of a ton of MSW into refuse derived fuel (RDF) and the remainder would go into recycling. The RDF typically has an ash content of 10-17% and a BTU range of 4,800 to 6,400 BTU/pound of RDF. Assuming a BTU content of 5,900 BTU/pound, RDF typically produces 1 kWh for every 2.6 pounds of RDF (SRI International, 1992). Taking projected county population and aggregating it to BEA regions and the county MSW and aggregating to BEA region, pounds of MSW per capita by BEA was determined. Using these data, the amount of MSW generated through 2025 was estimated. Using the state average proportion of MSW is landfilled, maximum landfill MSW was determined. The total MSW

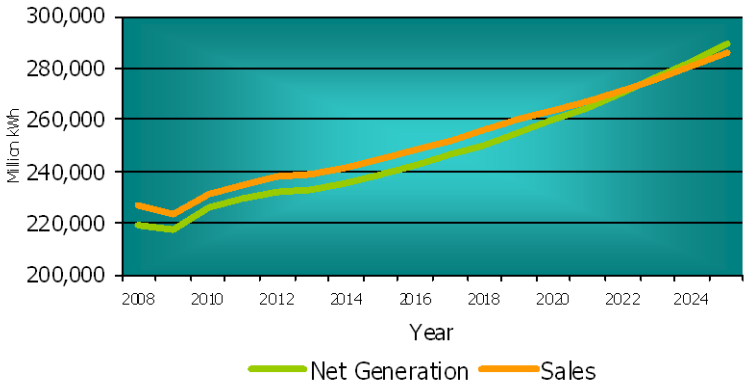


Figure 6. Projected Net Generation and Sales of Electricity for Florida

by BEA was then multiplied by an adjustment factor that projected a reduction in MSW landfilled between 2008 and 2020. By 2020, the amount going to the landfill was 25% of total MSW produced. The amount of material available for refuse derived fuel (RDF) was determined by subtracting the amount that goes to landfills from the maximum available for landfills. The projected RDF values and electricity potential for the state and BEA regions are shown in Table 14. The projected value of kWh that could be derived from RDF in 2025 is 11,263 million kWh.

Projections of Florida Electricity Demand and Net Generation

Because the federal proposals specify percentages of electricity kWh sales that would need to be derived from renewables, it is necessary to obtain projections of electricity demand for the state through 2025. In order to calculate electricity demand and net generation projections for Florida, several pieces of information were used -- actual electricity demand and net generation statistics for 2008 from EIA's Electric Power monthly and annual growth rate projections for the Florida Reliability Coordinating Council regions from EIA's Annual Energy Outlook. The actual values of net generation and electricity sales for 2008 are shown, along with the projected values, in Figure 6. By the year 2025, the projections are about 286.0 million MWh of sales and 289.1 million MWh of net generation.

Table 14. Projected Values for Refuse Derived Fuel From Metropolitan Solid Wastes, Florida, 2015, 2020, and 2025

BEA	2015	2020	2025
	Projected Tons/Year		
Miami	2,414,334	4,485,220	4,722,259
Orlando	1,663,574	3,188,650	3,448,797
Panama City	122,066	225,071	235,425
Pensacola	304,214	567,384	599,615
Sarasota	859,914	1,662,392	1,810,837
Tallahassee	130,973	241,603	252,960
Tampa	1,047,025	1,951,793	2,061,472
Gainesville	200,686	371,865	390,648
Jacksonville	551,954	1,045,380	1,119,313
Statewide	7,294,740	13,739,358	14,641,326
	Projected Million kWh/Year		
Miami	1,857	3,450	3,633
Orlando	1,280	2,453	2,653
Panama City	94	173	181
Pensacola	234	436	461
Sarasota	661	1,279	1,393
Tallahassee	101	186	195
Tampa	805	1,501	1,586
Gainesville	154	286	300
Jacksonville	425	804	861
Statewide	5,611	10,569	11,263

Projections to Meet the Federal Proposals

The 20% RES

Requirements under the 20% RES for a federal renewable energy portfolio standard are shown in Table 15. The 20% RES percentages are listed in the table. The percentages are taken of the prior year's electricity sales. Under the 20% RES, 25% or less can be met with energy efficiency credits. Therefore, in the table, the percentages adjusted for the 25% energy efficiency credits are calculated. These adjusted percentages are used to calculate the million kWh required under the 20% RES. Shown in Table 15, by 2025, the 20% RES would require an additional 42,901 million kWh.

Table 15. Projected Requirements Under the 20% RES

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Projected Electricity Demand (Million kWh)															
231,584	235,108	237,924	239,196	241,933	244,987	248,560	252,116	255,955	260,123	264,017	267,505	271,519	276,162	281,248	286,010
20% RES Percentage															
0	4	4	8	8	8	12	12	12	16	16	20	20	20	20	20
20% RES Percentage With 25% Energy Efficiency Credit															
0	3	3	6	6	6	9	9	9	12	12	15	15	15	15	15
20% RES Requirement (Million kWh)															
0	7,053	7,138	14,352	14,516	14,699	22,370	22,690	23,036	31,215	31,682	40,126	40,728	41,424	42,187	42,901

The 25% RES

The percentages of renewable energy required under the 25% RES (using the Energy Information Administration's projected percentages) are displayed in Table 16 (Adjusted 25% RES Percentage). Based upon the projected electricity demand shown and these percentages, the projected million kWh requirements under the 25% RES are calculated. Notably, by 2025, an additional 48,622 million kWh would need to be from renewable sources.

Table 16. Projected Requirements Under the 25% RES

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Projected Electricity Demand (Million kWh)															
231,584	235,108	237,924	239,196	241,933	244,987	248,560	252,116	255,955	260,123	264,017	267,505	271,519	276,162	281,248	286,010
Adjusted 25% RES Percentage															
0	0	3	3	5	5	6	6	8	8	10	10	12	12	13	17
Adjusted 25% RES Requirement (Million kWh)															
0	0	8,154	8,198	11,746	11,895	15,618	15,841	20,468	20,801	26,391	26,740	32,569	33,126	36,949	48,622

Placement of Additional Renewable Energy Facilities Across the State

The projected additional renewable energy generation under the 25% RES and 20% RES Scenarios by technology and BEA Region are shown in Table 17. Following Table 17, a summary of how each type of facility was located in its respective BEA Region is provided.

Table 17. Projected Additional Renewable Energy Generation Under the 25% RES and 20% RES Scenarios, by Technology and BEA Region, Florida, 2025

Technology	Gaines-ville	Jackson-ville	Miami	Orlando	Panama City	Pensa-cola	Sara-sota	Talla-hassee	Tampa	All Regions
					(million kWh)					
Solar Utility	0.0	0.0	0.0	876.3	90.5	0.0	0.0	943.2	0.0	1,910.0
Solar Rooftop	47.5	23.0	188.2	171.9	13.4	23.6	44.1	16.4	51.9	580.1
Landfill Gas	0.0	7.2	162.0	0.0	0.0	23.1	39.7	0.0	37.7	269.7
Co-Fire Wood	0.0	0.0	0.0	343.0	409.0	98.5	0.0	0.0	0.0	850.5
Direct Fire Wood	876.0	350.4	0.0	0.0	0.0	0.0	0.0	700.8	0.0	1,927.2
Direct Fire Citrus Waste	0.0	0.0	700.8	876.0	0.0	0.0	350.4	0.0	0.0	1,927.2
Layer Digester	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9
Broiler-Direct Fire	198.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	198.6
Dairy Digester	16.1	0.0	11.2	0.0	0.0	0.0	0.0	0.0	0.0	27.3
MSW Gasification	0.0	861.0	3,632.5	2,652.9	0.0	0.0	1,393.0	0.0	1,585.7	10,125.1
Direct Fire Dedicated Energy Crop	2,244.4	0.0	0.0	1,245.0	1,980.6	1,505.0	0.0	0.0	0.0	6,975.0
All Renewables	3,383.5	1,241.6	4,694.7	6,165.1	2,493.5	1,650.2	1,827.2	1,660.4	1,675.3	24,791.60

The solar rooftop electricity was allocated according to where residential structures were located. A maximum of .5% of all residential structures was used. Estimates of numbers housing units for 2007 by the Census Bureau were used. The projected allocation of generation by rooftop solar units by BEA region is shown in Figure 7. As can be seen from this figure, the majority of residential solar rooftop generation will occur in the Miami and Orlando BEA's. The utility scale solar was allocated according to existing and planned projects. These shares are

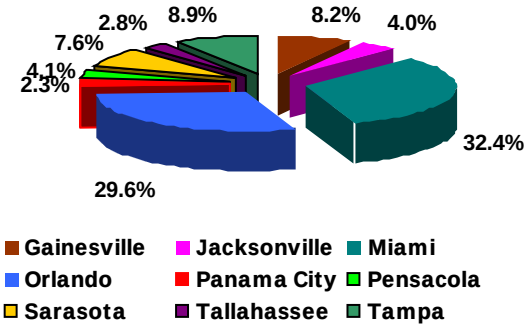


Figure 7. Projected Percentages of Solar Rooftop Generation by BEA Region, Florida

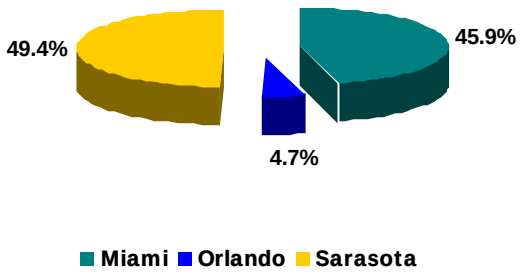


Figure 8. Projected Percentages of Solar Utility Scale Generation by BEA Region, Florida

shown in Figure 8. The Miami and Sarasota BEA's are projected to have the majority of solar utility scale projects.

The landfill methane gas projects were allocated to BEA region according to locations of candidate landfills as identified by the EPA Landfill Methane Outreach Program. Only landfills with at least 2 million tons of waste in place were included. The shares of landfill gas by BEA are shown in Figure 9. The majority of landfill gas facilities are projected to be in the Miami BEA. Locations of electricity generation facilities using metropolitan solid waste were based upon location of projections of tons of metropolitan solid waste landfilled. The shares by BEA is displayed in Figure 10.

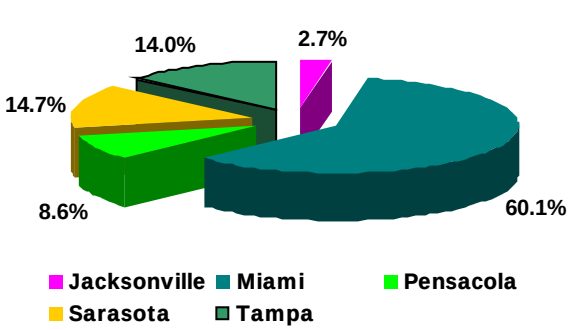


Figure 9. Projected Percentages of Landfill Gas Generation by BEA Region, Florida

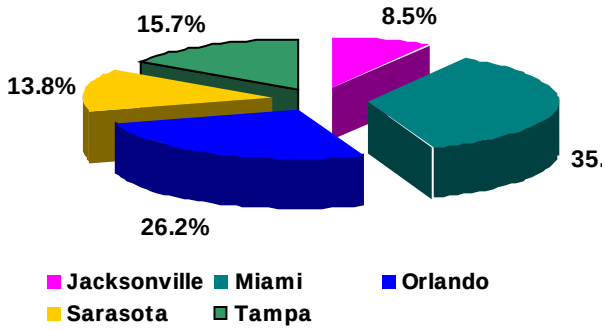


Figure 10. Projected Percentages of Gasification of Metropolitan Solid Waste by BEA Region, Florida

Poultry wastes in Florida are assumed to come from two types of facilities, broilers and layers. The electricity conversion facilities are sited according to the locations of these two types of poultry operations in the state. Broiler and layer numbers data are from the 2007 Census of Agriculture. All layer litter digester conversion facilities and broiler direct fire facilities are located in the Gainesville BEA. As with poultry wastes, the locations of conversion facilities for dairy manure to energy is based upon where dairy cattle are located in the state. Data are from the 2007 Census of Agriculture. Dairy manure wastes are projected to be generated in the Gainesville and Miami BEA's (Figure 11)

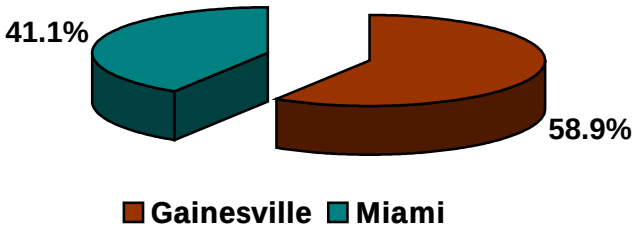


Figure 11. Projected Percentages of Dairy Manure Generation by BEA Region, Florida

Facilities locations for co-firing wood with coal were based upon two criteria: coal facilities and availability of wood residues. A co-fire rate of 15% in existing coal facilities was assumed. The wood requirements were then compared with availability of wood residues. As can be seen in Figure 12, using these criteria, the Panama City and Orlando BEA's are projected to have the

largest shares. Facilities using direct fire of wood were located based upon availability of wood residues after co-fire use (Figure 13). Direct fire facilities using wood are projected to be located in the Gainesville, Jacksonville, and Tallahassee BEA's.

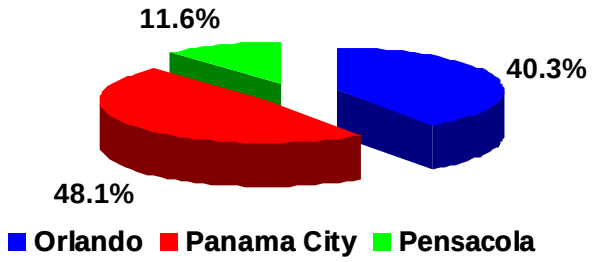


Figure 12. Projected Percentages of Co-Fire with Wood Generation by BEA Region, Florida

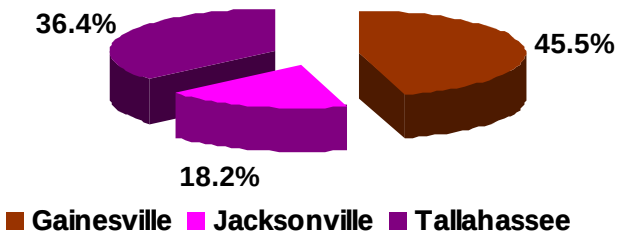


Figure 13. Projected Percentages of Direct Fire with Wood Generation by BEA Region, Florida

Location of facilities for direct fire of dedicated energy crops is based upon areas where sufficient dedicated energy crop production could occur. Dedicated energy crop production by Agricultural Supply District (ASD) was estimated as part of the 25x'25 analysis. Dedicated energy crop production was shared to county according to crop production patterns (corn, cotton, peanuts, and hay). As shown in Figure 14, direct fire from energy crops is projected to occur in the Gainesville, Orlando, Panama City, and Pensacola BEA's. Locations of facilities for direct fire of citrus waste are based upon areas where sufficient citrus waste production could occur. Citrus production was measured by boxes of citrus were used to weight the waste production by county. Data were from the Florida Agricultural Statistics Service. Displayed in Figure 15, the largest share of energy from citrus waste is projected to come from the Orlando BEA.

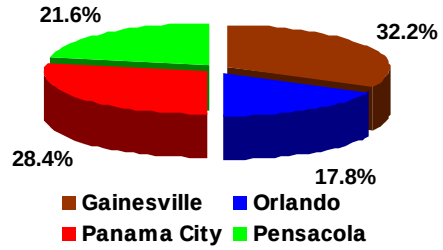


Figure 14. Projected Percentages of Direct Fire with Dedicated Energy Crop by BEA Region, Florida

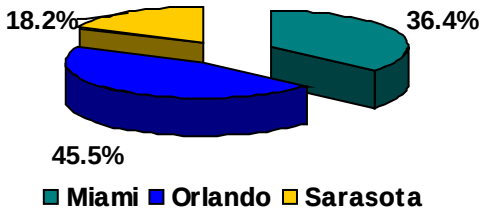


Figure 15. Projected Percentages of Direct Fire with Citrus Waste by BEA Region, Florida

Using the representative facilities sizes for each of the technologies, as displayed in the tables in Appendix B, the number of additional renewable energy facilities invested in and the number of additional facilities operating in each BEA region is projected. The projected numbers

of representative facilities invested in for each BEA region are shown in Table 18. These numbers of facilities along with the expenditures on investment for each type of facility shown in Appendix B are used to project the economic impacts from investment. As can be noted in Table 18, the projected numbers of facilities sometimes contained decimals or "parts of facilities". This is because sometimes planned facilities were a different size than the representative or example facilities in Appendix B, therefore the planned facilities were expressed as proportions of the example facilities for the purposes of projecting the economic impacts.

Table 18. Assumed Additional Renewable Electricity Generating Facilities Investment to Meet the 25% RES and 20% RES Scenarios, 2010-2015, 2016-2020, and 2021-2025, Florida

BEA Region/State	2010-2015	2016-2020	2021-2025	2010-2015	2016-2020	2021-2025
	Solar Utility			Solar Rooftop		
Gainesville	0.0	0.0	0.0	1,475.3	1,044.6	1,044.6
Jacksonville	0.0	0.0	0.0	715.6	506.7	506.7
Miami	4.5	2.0	0.1	5,848.9	4,141.5	4,141.5
Orlando	0.5	0.2	0.0	5,343.8	3,783.9	3,783.9
Panama City	0.0	0.0	0.0	416.7	295.0	295.0
Pensacola	0.0	0.0	0.0	734.1	519.8	519.8
Sarasota	4.8	2.2	0.1	1,372.2	971.6	971.6
Tallahassee	0.0	0.0	0.0	510.7	361.6	361.6
Tampa	0.0	0.0	0.0	1,614.0	1,142.8	1,142.8
Total	9.8	4.4	0.2	18,031.2	12,767.6	12,767.6
	Landfill Gas			Co-Fire Wood		
Gainesville	0.0	0.0	0.0	0.0	0.0	0.0
Jacksonville	0.2	0.0	0.0	0.0	0.0	0.0
Miami	4.7	0.0	0.0	0.0	0.0	0.0
Orlando	0.0	0.0	0.0	3.1	0.0	0.0
Panama City	0.0	0.0	0.0	3.7	0.0	0.0
Pensacola	0.7	0.0	0.0	0.9	0.0	0.0
Sarasota	1.2	0.0	0.0	0.0	0.0	0.0
Tallahassee	0.0	0.0	0.0	0.0	0.0	0.0
Tampa	1.1	0.0	0.0	0.0	0.0	0.0
Total	7.8	0.0	0.0	7.7	0.0	0.0
	Direct Fire Wood			Direct Fire Citrus Waste		
Gainesville	5.0	0.0	0.0	0.0	0.0	0.0
Jacksonville	2.0	0.0	0.0	0.0	0.0	0.0
Miami	0.0	0.0	0.0	4.0	0.0	0.0
Orlando	0.0	0.0	0.0	5.0	0.0	0.0
Panama City	0.0	0.0	0.0	0.0	0.0	0.0
Pensacola	0.0	0.0	0.0	0.0	0.0	0.0
Sarasota	0.0	0.0	0.0	2.0	0.0	0.0
Tallahassee	4.0	0.0	0.0	0.0	0.0	0.0
Tampa	0.0	0.0	0.0	0.0	0.0	0.0
	11.0	0.0	0.0	11.0	0.0	0.0

Table 18. Assumed Additional Renewable Electricity Generating Facilities Investment to Meet the 25% RES and 20% RES Scenarios, 2010-2015, 2016-2020, and 2021-2025, Florida

BEA Region/State	2010-2015	2016-2020	2021-2025	2010-2015	2016-2020	2021-2025
	Layer Digester			Broiler-Direct Fire		
Gainesville	2.5	0.0	0.0	0.5	0.0	0.0
Jacksonville	0.0	0.0	0.0	0.0	0.0	0.0
Miami	0.0	0.0	0.0	0.0	0.0	0.0
Orlando	0.0	0.0	0.0	0.0	0.0	0.0
Panama City	0.0	0.0	0.0	0.0	0.0	0.0
Pensacola	0.0	0.0	0.0	0.0	0.0	0.0
Sarasota	0.0	0.0	0.0	0.0	0.0	0.0
Tallahassee	0.0	0.0	0.0	0.0	0.0	0.0
Tampa	0.0	0.0	0.0	0.0	0.0	0.0
Total	2.5	0.0	0.0	0.5	0.0	0.0
	Dairy Digester			MSW Gasification		
Gainesville	14.9	0.0	0.0	0.0	0.0	0.0
Jacksonville	0.0	0.0	0.0	0.0	1.1	0.1
Miami	10.4	0.0	0.0	2.6	2.3	0.3
Orlando	0.0	0.0	0.0	1.8	1.7	0.3
Panama City	0.0	0.0	0.0	0.0	0.0	0.0
Pensacola	0.0	0.0	0.0	0.0	0.0	0.0
Sarasota	0.0	0.0	0.0	0.0	1.8	0.2
Tallahassee	0.0	0.0	0.0	0.0	0.0	0.0
Tampa	0.0	0.0	0.0	1.0	1.1	0.1
Total	25.3	0.0	0.0	5.5	8.1	0.9
	Dedicated Energy Crop Direct Fire					
Gainesville	1.7	6.2	4.8			
Jacksonville	0.0	0.0	0.0			
Miami	0.0	0.0	0.0			
Orlando	1.0	3.5	2.7			
Panama City	1.5	5.5	4.3			
Pensacola	1.2	4.2	3.3			
Sarasota	0.0	0.0	0.0			
Tallahassee	0.0	0.0	0.0			
Tampa	0.0	0.0	0.0			
Total	5.4	19.4	15.1			

Purchase of Renewable Energy Credits

The projected million kWh of renewable electricity produced in Florida does not meet the requirements under the 25% RES or 20% RES's. Hence, the state is projected to need to purchase renewable energy credits (REC's). Projected purchases of REC's are shown in Table 19. Under the 20% RES, from 2010 to 2025, a cumulative total of 158,374 million kWh of REC's is projected to be purchased. Under the 25% RES, a total of 82,907 million kWh of REC's is

projected to be purchased. The REC's purchases were allocated to BEA regions based upon county population for residential use and based upon county business patterns for commercial use.

Table 19. Projected Renewable Energy Credit Purchases Under the 20% RES and 25% RES's

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
(Million kWh)															
20% RES Requirement															
0	7,053	7,138	14,352	14,516	14,699	22,370	22,690	23,036	31,215	31,682	40,126	40,728	41,424	42,187	42,901
Projected Renewable Energy Production 20% RES															
0	3,533	4,773	5,981	6,878	11,521	14,238	15,779	17,268	19,478	21,314	22,006	22,699	23,394	24,091	24,792
Renewable Energy Credits 20% RES															
0	3,520	2,365	8,371	7,638	3,178	8,133	6,911	5,768	11,737	10,368	18,119	18,029	18,031	18,096	18,110
25% RES Requirement															
0	0	8,154	8,198	11,746	11,895	15,618	15,841	20,468	20,801	26,391	26,740	32,569	33,126	36,949	48,622
Projected Renewable Energy Production 25% RES															
0	0	4,773	5,981	6,878	11,521	14,238	15,779	17,268	19,478	21,314	22,006	22,699	23,394	24,091	24,792
Renewable Energy Credits 25% RES															
0	0	3,381	2,217	4,868	374	1,380	62	3,200	1,324	5,077	4,733	9,870	9,732	12,858	23,830

Economic Impacts: Investment and Operating

Multiple annual impacts accrue from development of a renewable energy industry. The impacts reported in this section include both the impacts of investing in and operating a renewable electricity industry. The impacts from the renewable electricity industry will come not only from electricity generation, but also from production of feedstocks for renewable electricity. Therefore, impacts are also reported for harvesting dedicated energy crops, collecting livestock manure, and of land shifts out of traditional crops to dedicated energy crops, and the impacts of a change in electricity prices (assuming the increased cost of producing the renewable electricity is passed on to consumers). Impacts presented include total industry output, employment, and value-added to the state's and BEA Regions' economies.

More detailed tables are presented in Appendix C, which display two types of impacts, direct and total. The direct impacts are the expenditures directly from the additions to demand for a particular industry. The total impacts include the direct impacts along with impacts from multiplier effects. These additional impacts include both indirect and induced. The indirect impacts are those that result from the industry's expenditures on input supplies and services. The induced impacts are those that result from those who are employed in the industry spending their income in the study region.

Economic Impacts: Investment in a Renewable Electricity Industry

Based upon the facilities numbers, facilities locations by BEA Region, and expenditures by representative facilities shown in Appendix B, economic impacts are projected using IMPLAN. Economic impacts by BEA Region from the investment in additional renewable energy facilities under each of the three policy scenarios are shown in Appendix C Tables C.1-C.3. Table C.1

displays the TIO from the investment in the additional renewable energy facilities, while Table C.2 displays the employment, and Table C.3 displays the value-added. It should be noted that investment impacts are one-time impacts that occur in the year when the facilities are constructed.

Economic Activity (Total Industry Output) from Investment

Figure 16 displays the TIO that would occur from investment in additional renewable electricity facilities under the two policy scenarios (The 25% RES and the 20% RES) for 2015 and 2025. The figure provides the overall TIO and what shares the BEA Regions would accrue. These TIO values represent total impacts (direct + indirect + induced impacts). Under both scenarios, the Miami Region is projected to experience the greatest TIO, with the Sarasota Region second, and the Orlando Region third. Statewide, the 2015 TIO from investment in additional renewable facilities is $16.7 billion under either federal proposal.

Employment from Investment

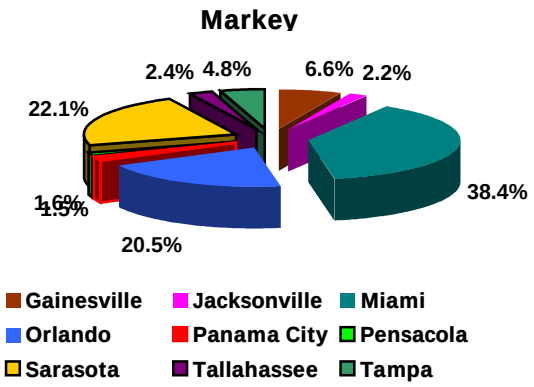
The total number of jobs involved in the renewable energy industry directly as a result of investment in facilities in 2015 is just over 33,400 (Table 20). Including multiplier effects, the additional jobs created from investment in 2015 is over 103,000. These jobs are distributed similarly to the projected economic activity, with Miami region adding the greatest number of jobs. For 2025, the additional jobs are 8,237 direct and 29, 724 total. In this time frame, the Orlando region experiences the greatest additions to jobs from investment.

Economic Impacts: Year-to-Year Operations of a Renewable Electricity Industry

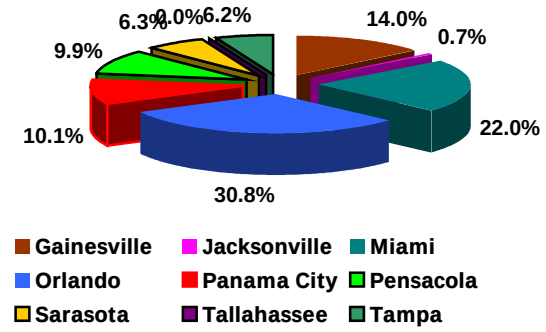
Some economic impacts occur each year as a result of the year-to-year business activities of the renewable energy industry. This section presents a summary of those projections. Detailed economic impacts by BEA Region from the year-to-year operations of the additional renewable energy facilities for the three policy scenarios are shown in Tables C.4-C.6. Table C.4 shows the total industry output from the annual operations of the additional renewable energy facilities, while Table C.5 displays the employment, and Table C.6 shows the value-added.

Economic Activity (Total Industry Output) from Operating

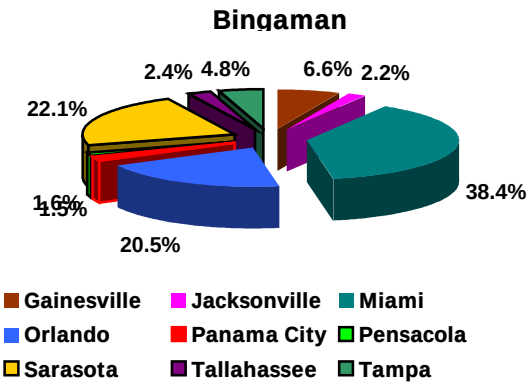
In addition to economic activity resulting from investment in renewable facilities, operation of the renewable energy facilities is projected to add economic activity to Florida's economy annually. In 2025, the annual impact is $11.2 billion, if either federal proposal is adopted. Figure 10 displays the Total Industry Output that would occur from operations of the additional renewable energy facilities for 2015. The figure provides the overall TIO and what shares the BEA regions would accrue. These TIO values represent total impacts (direct + indirect + induced impacts). Under each policy scenario, the Miami Region is projected to experience the greatest TIO, with the Orlando Region second, and the Sarasota Region third.



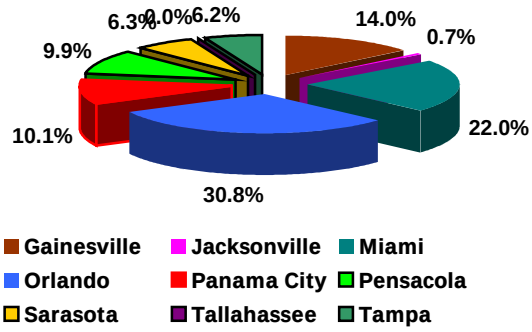
Year	Statewide Total Industry Output (Million $)
2015	$16,660.6



Year	Statewide Total Industry Output (Million $)
2025	$5,277.4



Year	Statewide Total Industry Output (Million $)
2015	$16,662.7



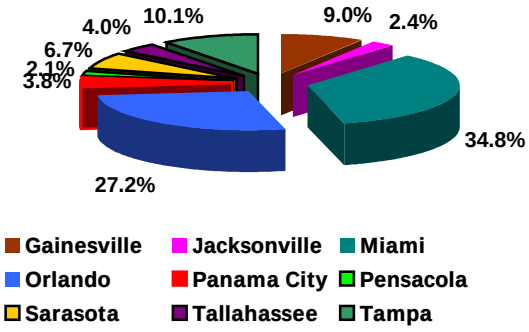
Year	Statewide Total Industry Output (Million $)
2025	$5,277.4

Figure 16. Total Industry Output from Investment in a Renewable Electricity Industry Under the 25% RES and 20% RES Proposals, Florida, 2015 and 2025

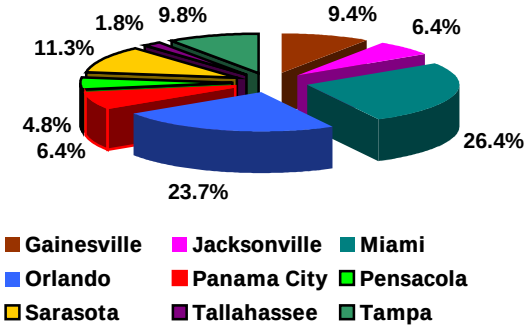
Table 20. Employment Projections From Investment in a Renewable Electricity Industry Under the Federal Policy Scenarios, Florida, 2015 and 2025

BEA Region/State	The 25% RES		The 20% RES	
	2015			
	Direct	Total	Direct	Total
Gainesville	3,336	6,959	3,341	6,969
Jacksonville	733	1,898	733	1,898
Miami	12,084	34,127	12,084	34,127
Orlando	5,626	17,474	5,626	17,474
Panama City	731	1,534	731	1,534
Pensacola	500	1,378	500	1,378
Sarasota	8,952	21,963	8,952	21,963
Tallahassee	1,366	2,660	1,366	2,660
Tampa	1,430	4,251	1,430	4,251
Florida	33,475	103,444	33,480	103,457
	2025			
	Direct	Total	Direct	Total
Gainesville	1,911	4,073	1,911	4,073
Jacksonville	105	215	105	215
Miami	887	4,432	887	4,432
Orlando	1,710	6,717	1,710	6,717
Panama City	1,567	3,089	1,567	3,089
Pensacola	1,098	2,651	1,098	2,651
Sarasota	454	1,451	454	1,451
Tallahassee	0	0	0	0
Tampa	262	1,353	262	1,353
Florida	8,237	29,724	8,237	29,724

Markey

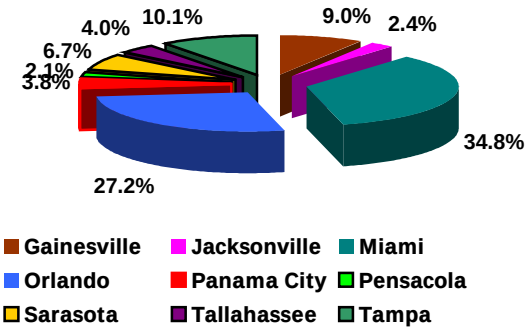


Year	Statewide Total Industry Output (Million $)
2015	$4,939.5

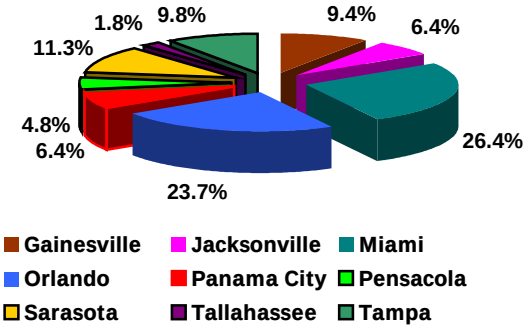


Year	Statewide Total Industry Output (Million $)
2025	$11,173.6

Bingaman



Year	Statewide Total Industry Output (Million $)
2015	$4,940.1



Year	Statewide Total Industry Output (Million $)
2025	$11,174.1

Figure 17. Total Industry Output from Operating a Renewable Electricity Industry Under the 25% RES and 20% RES Proposals, Florida, 2015 and 2025

In Table C.7, the total industry output (including direct, indirect, and induced impacts) from year-to-year operations by BEA Region and by renewable technology are shown for each of the two policy scenarios. Figure 18 contains the economic impacts as measured by increased total industry output for 2025 as a result of the individual projected technologies. As can be seen these figures, the largest annual operating economic impacts are projected to be derived from gasification of metropolitan solid waste, followed by direct fire of a dedicated energy crop, and utility scale solar.

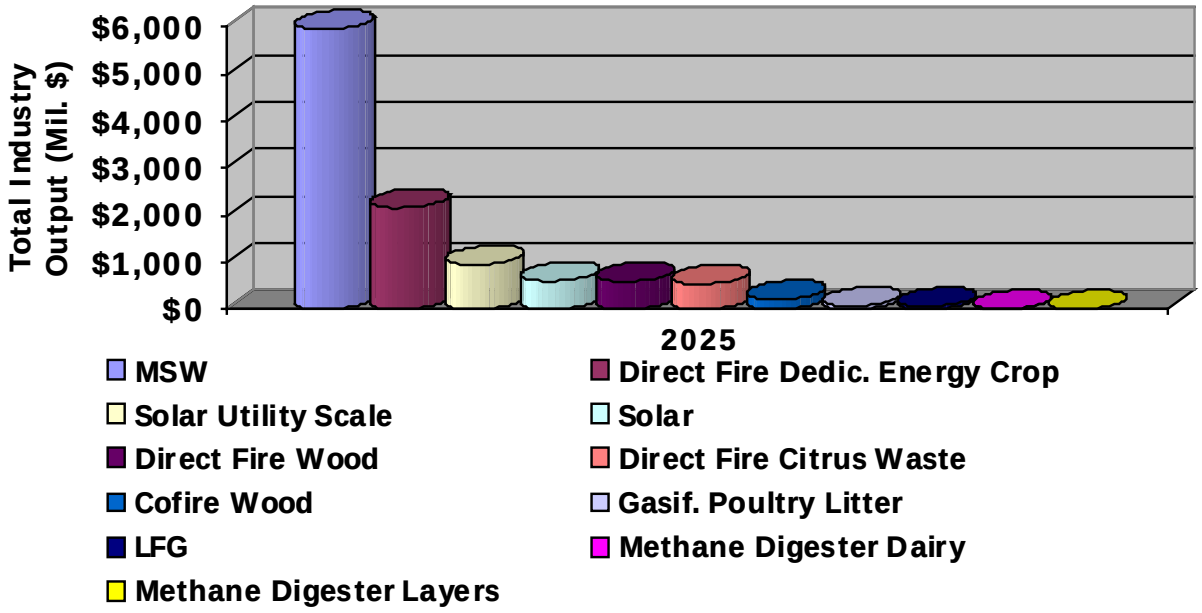


Figure 18. Total Industry Output from Operating a Renewable Electricity Industry Under the Federal Proposals, By Renewable Energy Technology, Florida, 2025

Employment from Operating

The total number of jobs involved in the renewable energy industry directly created from operating is 1,660 in 2015 3,511 in 2025. When the multiplier effects are included, the jobs are over 19,000 in 2015 and over 42,800 in 2025. Table 21 presents the jobs by BEA Region, with the Miami Region attaining the greatest number of jobs annually from operating the renewable energy industry.

Table 21. Employment Projections From Operating a Renewable Electricity Industry Under the Federal Policy Scenarios, Florida, 2015 and 2025

BEA Region/State	The 25% RES		The 20% RES	
	2015			
	Direct	Total	Direct	Total
Gainesville	206	1,559	206	1,560
Jacksonville	58	398	58	398
Miami	553	5,313	553	5,313
Orlando	369	4,291	369	4,291
Panama City	66	621	66	619
Pensacola	57	370	57	370
Sarasota	111	887	111	887
Tallahassee	104	633	104	633
Tampa	137	1,672	137	1,672
Florida	1,660	19,025	1,660	19,027
	2025			
	Direct	Total	Direct	Total
Gainesville	494	3,907	494	3,909
Jacksonville	186	2,390	186	2,390
Miami	827	9,115	827	9,115
Orlando	734	8,518	734	8,518
Panama City	320	2,537	320	2,537
Pensacola	250	2,035	250	2,035
Sarasota	329	3,805	329	3,805
Tallahassee	104	633	104	633
Tampa	268	3,695	268	3,695
Florida	3,511	42,800	3,511	42,802

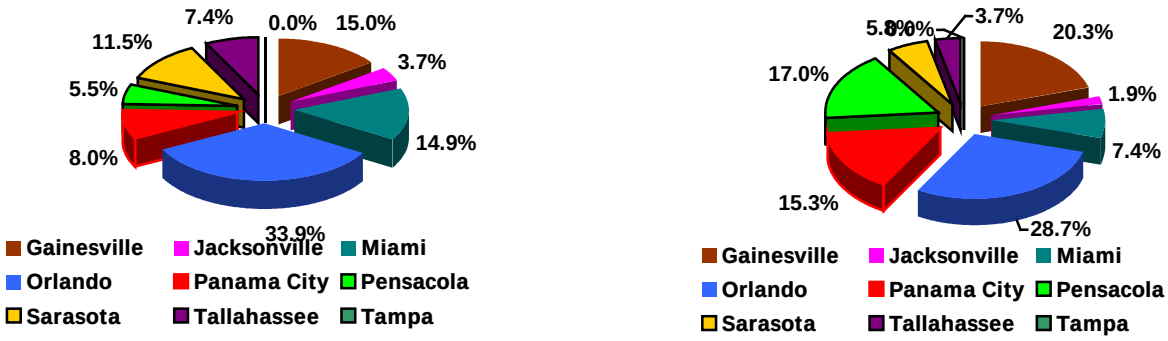
Economic Impacts: Agricultural Sector

Several types of impacts from with agricultural activity associated with the renewable energy industry are measured in this analysis – the impact of growing a dedicated energy crop, of collecting wastes, such as citrus wastes or poultry or dairy wastes, to use in energy, and the impact of land use changes toward dedicated energy crops. Projected land use changes that occur in Florida as a result of producing dedicated energy crops on agricultural lands were derived from previous POLYSYS analysis done for 25x25. For every acre of dedicated energy crop grown, 0.39 acres of traditional cropland (corn, cotton, soybeans, and wheat) were converted. Other lands required for a dedicated energy crop came from pastureland with the remaining pastureland under increased management so that the same animal units could be maintained. The direct economic activity under the federal proposals is estimated to exceed $447 million in the year 2025. When multiplied through the economy, this increases to just under $819 million (Table 22). The largest share of this economic activity is projected to take place in the Gainesville Region, followed by the Orlando Region. See Appendix C, Tables C8 through C10 for detailed estimates of changes in economic activity, jobs, and value-added, respectively.

Table 22. Annual Total Industry Output from Additions to Agricultural Feedstock Production, Florida, 2015 and 2025

BEA Region/State	The 25% RES		The 20% RES	
		(Million $)		
		2015		
	Direct	Total	Direct	Total
Gainesville	$46.0	$69.5	$46.1	$69.6
Jacksonville	$11.4	$17.7	$11.4	$17.7
Miami	$24.9	$44.2	$24.9	$44.2
Orlando	$49.6	$88.7	$49.6	$88.7
Panama City	$22.6	$34.8	$22.5	$34.6
Pensacola	$14.1	$21.9	$14.1	$21.9
Sarasota	$12.4	$21.7	$12.4	$21.7
Tallahassee	$22.8	$33.4	$22.8	$33.4
Tampa	$0.0	$0.0	$0.0	$0.0
Florida	$204.1	$373.6	$204.1	$373.7
		2025		
	Direct	Total	Direct	Total
Gainesville	$110.6	$168.1	$110.7	$168.2
Jacksonville	$11.4	$17.7	$11.4	$17.7
Miami	$24.9	$44.2	$24.9	$44.2
Orlando	$98.7	$174.9	$98.7	$174.9
Panama City	$82.2	$124.4	$82.2	$124.4
Pensacola	$84.1	$133.2	$84.1	$133.2
Sarasota	$12.4	$21.7	$12.4	$21.7
Tallahassee	$22.8	$33.4	$22.8	$33.4
Tampa	$0.0	$0.0	$0.0	$0.0
Florida	$447.1	$818.9	$447.1	$819.0

Figure 19 shows the total employment from agricultural feedstock production by BEA region for 2015 and 2025. In 2015, an additional 2,888 jobs from year-to-year operations of agricultural feedstock production are projected to occur. In 2025, an additional 5,657 jobs are projected to occur. The largest employment impacts are projected to occur in the Orlando Region followed by the Gainesville Region.



Statewide Total Employment	
2015	2025
2,888 jobs	5,657 jobs

Figure 19. Employment from Agricultural Feedstock Production Under the 25% RES and 20% RES's, By BEA Region, Florida, 2015 and 2025

Economic Impacts of Potential Rate Increases

With the additional renewable electricity, electric rates per kWh are projected to increase. As outlined in the methods, the rate increase projections are based upon "breakeven" prices for the various technologies and projections of electricity sales by type of technology. Shown in Table 23, the projected electricity rate change per kWh is just over 1 cents per kWh by the year 2025.

Table 23. Projected Electricity Rate Changes Under the Federal Policy Scenarios, Florida, 2015, 2020, and 2025

Year	Electricity Rate Change $/KWh	
	25% RES	20% RES
2015	.0044	.0047
2020	.0093	.0099
2025	.0115	.0109

The projected economic impacts occurring each year from the rate changes (Table 24) are displayed in Table 25. Notably, including multiplier effects, in 2025, the negative impact on household incomes decreases total industry output by $1645.1 under the 25% RES and by $1,559.4 under the 20% RES.

Table 24. Projected Annual Economic Impacts from Electricity Rate Changes Under the Federal Policy Scenarios, Florida, 2015, 2020, and 2025

	2015	2020	2025
	Total Industry Output (Million $)		
The 25% RES	-$537.3	-$1,221.2	-$1,645.1
The 20% RES	-$579.2	-$1,300.2	-$1,559.4

Conclusions

This study projected potential economic impacts for Kansas under two proposed federal energy policies: the 25% RES (Save American Energy and American Renewable Energy Acts) and the 20% RES. To conduct the analysis, renewable electricity requirements under the federal proposals are projected. The changes in economic activity resulting from the changes in renewable electricity requirements are projected using IMPLAN, an economic input-output model. Projected economic impacts are reported for the years 2015, 2020, and 2025.

Florida is projected to require using renewable energy from a variety of sources, as well as renewable energy credits to meet the requirements under either of the proposals. Key sources will like include gasification of metropolitan solid waste, direct fire of dedicated energy crops, and utility scale solar.

Potential impacts to the agricultural sector are multiple, occurring from production of dedicated energy crops, collection of livestock wastes (poultry and dairy), and collection of agricultural wastes (citrus wastes). Because of the diversity of agricultural feedstocks projected as being used for energy, multiple areas of the state could benefit.

It should be noted, however, that electricity from renewable energy technologies is more expensive than from conventional sources. Therefore, the overall electricity price is projected to increase. These increases in costs per kWh will have a negative impact on household incomes available for spending on other goods and services. The annual economic impacts from these rate increases are projected at -$2,961 million under the 25% RES and -$2,806 million under the 20% RES in the year 2025.

Table 25. Summary of Annual Economic Impacts, Florida, 2025

Impact	The 25% RES	The 20% RES
	Total Industry Output (Million $)	
Operating	$11,174	$11,174
Household	-$2,961	-$2,806
Net	$8,213	$8,368
Contribution from agriculture	$819	$819

The Florida agricultural sector averaged over $7.5 billion in receipts in 2000 to 2007. With $5 billion in expenses, the agricultural sectors realized net farm income has average slightly more than $2.49 billion over the same period (Figure 16). With either RES, the potential impacts to the agricultural sector are multiple, occurring from production of dedicated energy crops, and the collection of broiler wastes, citrus waste, and wood residues. Economic activity from either RES could increase by $0.45 billion by 2025 or nearly $10,000 per farm if the potential co- and direct-fire projects are undertaken (Figure 17 and Appendix D). The largest per farm gains occur in the Florida Panhandle and the area surrounding Gainesville.

Although there are negative impacts from increased electricity prices (-$2,961 million and -$2,806 million), the overall economic impacts from operating the additional renewable electricity industry are still positive ($8,213 million and $8,368). Of these operating impacts, over $819 million come from agriculture.

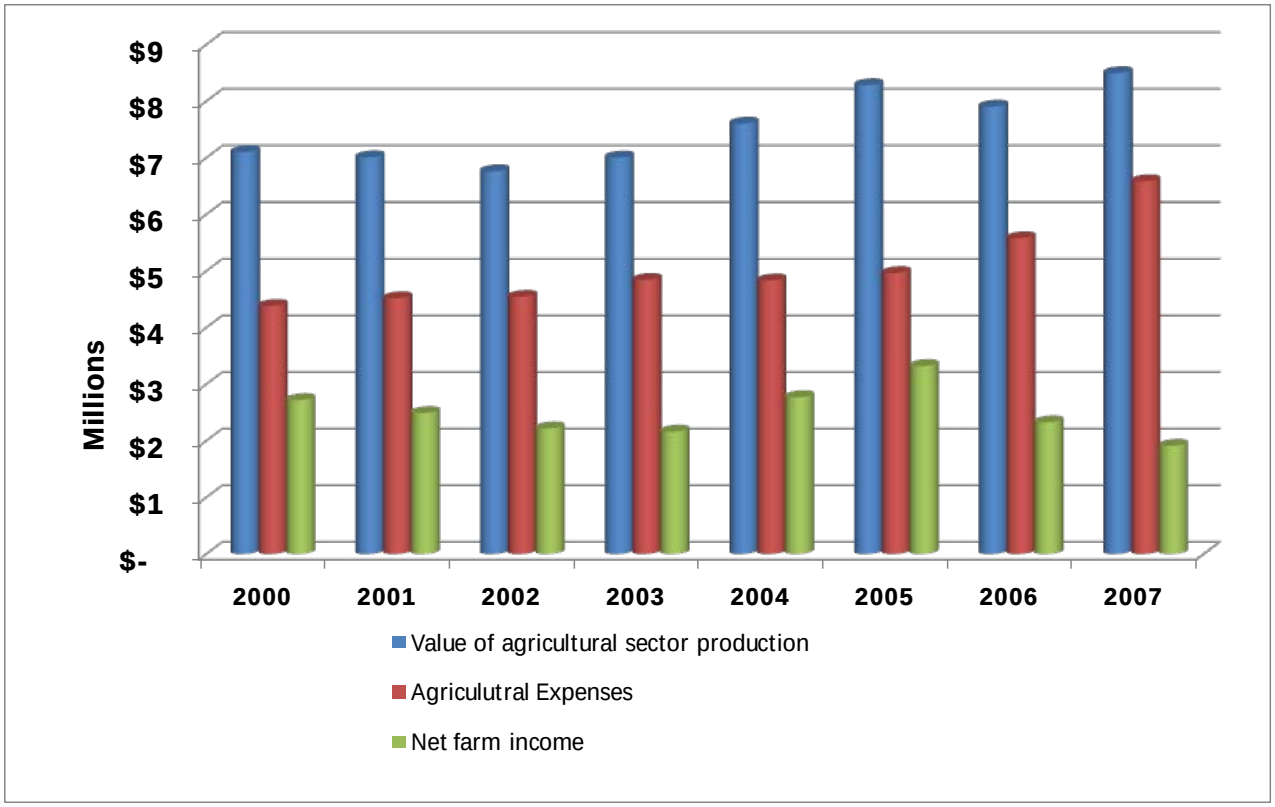
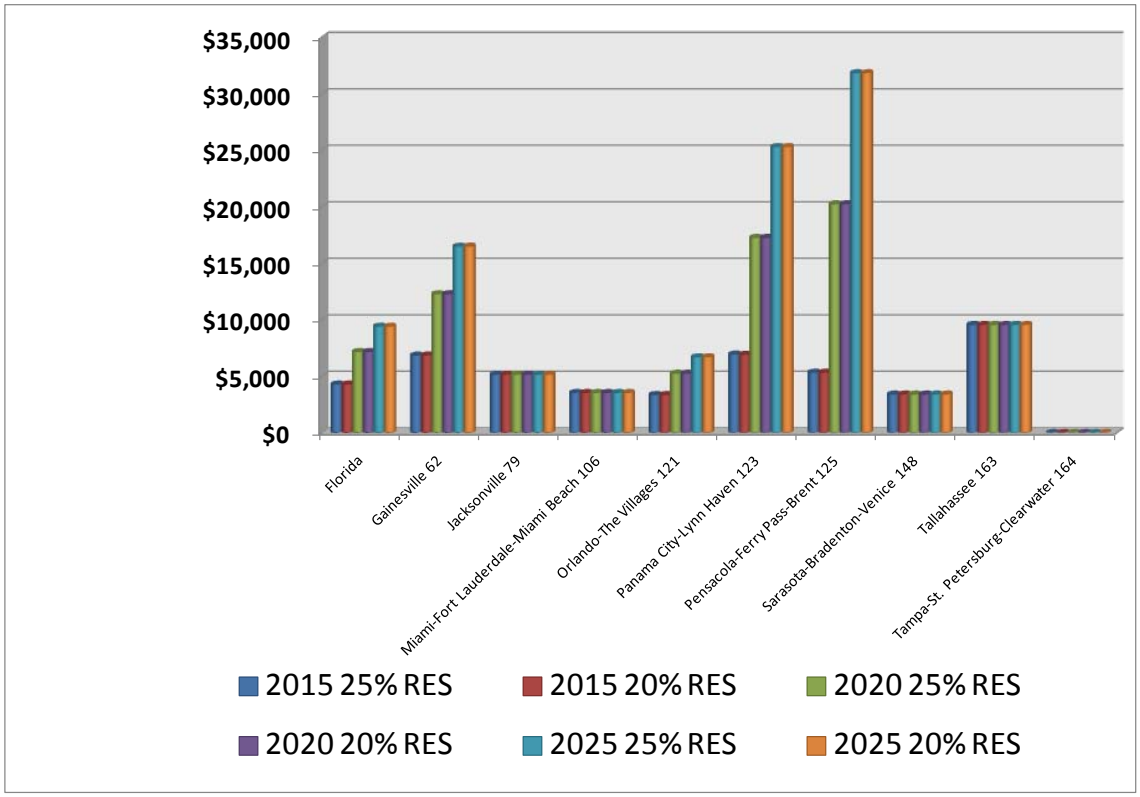


Figure 20. Florida Agricultural Receipts, Expenses, and Realized Net Farm Income, 2000 - 2008.



(Source: Derived from Economic Research Service, USDA, 2009)

Figure 21. Potential Gains in Per Farm Economic Activity by BEA, 2015, 2020, and 2025.

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APPENDIX A
ENERGY SOURCE ABBREVIATIONS

Table A.1. Energy Source Abbreviations

Abbrev-iation	Description	Abbrev-iation	Description
BIT	(Anthracite Coal, Bituminous Coal)	BLQ*	Black Liquor
LIG	Lignite Coal	GEO*	Geothermal
SUB	Subbituminous Coal	LFG*	Landfill Gas
WC	Waste/Other Coal (Anthracite Culm, Bituminous Gob, Fine Coal, Lignite Waste, Waste Coal)	MSW*	Municipal Solid Waste
SC	Coal Synfuel. Coal-based solid fuel that has been processed by a coal synfuel plant, and coal-based fuels such as briquettes, pellets, or extrusions, which are formed from fresh or recycled coal and binding materials.	OBS*	Other Biomass Solid (Animal Manure and Waste, Solid Byproducts, and other solid biomass not specified)
DFO	Distillate Fuel Oil (includes all Diesel and No. 1, No. 2, and No. 4 Fuel Oils)	OBL*	Other Biomass Liquid (Ethanol, Fish Oil, Liquid Acetonitrile Waste, Medical Waste, Tall Oil, Waste Alcohol, and other Biomass not specified)
JF	Jet Fuel	OBG *	Other Biomass Gases (Digester Gas, Methane, and other biomass gases)
KER	Kerosene	OTH	Other (Batteries, Chemicals, Coke Breeze, Hydrogen, Pitch, Sulfur, Tar Coal, and miscellaneous technologies)
RFO	Residual Fuel Oil (includes No. 5 and No. 6 Fuel Oils and Bunker C Fuel Oil)	PUR	Purchased Steam
WO	Oil-Other and Waste Oil (Butane (Liquid), Crude Oil, Liquid Byproducts, Oil Waste, Propane (Liquid), Re-refined	SLW	Sludge Waste
PC	Petroleum Coke	SUN*	Solar (Photovoltaic, Thermal)
NG	Natural Gas	TDF	Tires
BFG	Blast Furnace Gas	WAT	Water (Conventional, Pumped Storage)
OG	Other Gas (Butane, Coal Processes, Coke-Oven, Refinery, and other processes)	WDS*	Wood/Wood Waste Solids (Paper Pellets, Railroad Ties, Utility Poles, Wood Chips, and other wood solids)
PG	Propane	WDL*	Wood Waste Liquids (Red Liquor, Sludge Wood, Spent Sulfite Liquor, and other wood related liquids not
SG	Synthetic Gas, other than coal-derived	WND*	Wind
SGC	Synthetic gas, derived from coal		
NUC	Nuclear (Uranium, Plutonium, Thorium)		
AB*	Agriculture Crop Byproducts/Straw/Energy Crops		

*Classified as “renewable” energy sources in this study.

APPENDIX B
EXPENDITURES BY REPRESENTATIVE RENEWABLE ENERGY FACILITIES

Conversion Technology: Large Residential or Small Commercial Solar Photovoltaic
Facility Size (Nameplate): 0.01 MW (dc)
Capacity Factor: 0.152
Generation/Year: 13,315 kWh (dc)/year
Total Industry Output: $1,391 ($0.1045/kWh)
Breakeven Total Industry Output: $5,168 ($0.3881/kWh)
Employees: 0
Source: Borenstein, Severin. 2008. "The Market Value and Cost of Solar Photovoltaic Electricity Production". Center for the Study of Energy Markets, University of California Energy Institute; Renewable Energy Technical Assessment Guide—TAG-RE: 2006. EPRI, Palo Alto, CA: 2007. 1012722

Table B.1. IMPLAN Expenditures for Solar Photovoltaic Technology

Type	IMPLAN Sector	IMPLAN Sector Description	Expenditures*
Investment	311	Semiconductors & Related Device Manufacturing (Solar Panels)	$82,863
Operating	485	Commercial Machinery Repair & Maintenance	$275
Depreciation	311	Semiconductors & Related Device Manufacturing	$3,836

*2006 dollars

Expenditure Summary for Solar Photovoltaic Technology

Expenditure Type	Total $*	$/kWh
Investment	$82,863	$6.22
Operating	$275	$0.02
Depreciation	$3,836	$0.29

*2006 dollars

Conversion Technology: Utility Scale Solar Photovoltaic Power Plant (One-Axis Tracking)
Facility Size (Nameplate): 50 MW
Capacity Factor: 0.305
Generation/Year: 133,590,000 kWh/year
Total Industry Output: $13,960,155 ($0.1045/kWh)
Breakeven Total Industry Output: $26,541,643 ($0.1987/kWh)
Employees: 5
Source: Renewable Energy Technical Assessment Guide—TAG-RE: 2006. EPRI, Palo Alto, CA: 2007. 1012722

Table B.2. IMPLAN Expenditures for Utility Scale Solar Photovoltaic Power Plant (One-Axis Tracking)

Type	IMPLAN Sector	IMPLAN Sector Description	Expenditures*
Investment	311	Semiconductors & Related Device Manufacturing (Heliostats, Collectors, & Concentrators)	$154,950,457
Investment	425	Banking (Project & Process Contingency)	$29,105,109
Investment	439	Architectural & Engineering Services (General Facilities & Engineering Fees)	$25,751,548
Investment	442	Computer System Design Services (Balance of Plant)	$61,123,024
Investment	451	Management of Companies & Enterprises (Owner costs)	$11,268,875
Operating	485	Commercial Machinery Repair & Maintenance	$441,955
Depreciation	311	Semiconductors & Related Device Manufacturing	$15,495,046

*2006 dollars

Expenditure Summary for Solar Photovoltaic Technology

Expenditure Type	Total $*	$/kWh
Investment	$282,199,014	$2.11
Operating	$441,955	$0.003
Depreciation	$15,495,046	$0.12

*2006 dollars

Conversion Technology: Landfill Gas
Facility Size (Nameplate): 4.6 MW
Capacity Factor: 0.856
Generation/Year: 34,457,555 kWh/year
Total Industry Output: $3,600,814 ($0.1045/kWh)
Breakeven Total Industry Output: N/A (Profitable)
Employees: 30
Source: Environmental Protection Agency, Landfill Methane Outreach Program. 2005. Documents, Tools, and Resources. Energy Project Landfill Gas Utilization Software (E-Plus).

Table B.3. IMPLAN Expenditures for Landfill Gas

Type	IMPLAN Sector	IMPLAN Sector Description	Expenditures*
Investment	41	Other New Construction (Electricity Generation Installation & Other Costs, Gas Treatment Installation & Other Costs, Inter Connect Installation & Other Costs)	$2,041,998
Investment	205	Iron, Steel Pipe & Tube from Purchased Steel (Pipe)	$1,687,370
Investment	239	Metal Tank, Heavy Gauge, Manufacturing (Condensate Knockout)	$112,638
Investment	261	Oil & Gas Field Machinery & Equipment (Well & Well Heads)	$775,457
Investment	275	Air Purification Equipment Manufacturing (Filters)	$16,577
Investment	276	Industrial & Commercial Fan and Blower Manufacturing (Blowers)	$51,696
Investment	277	Heating Equipment, except Warm Air Furnaces (Radiator Costs)	$238,008
Investment	289	Air & Gas Compressor Manufacturing (Compressor)	$92,700
Investment	298	Industrial Process Furnace & Oven Manufacturing (Flares)	$76,340
Investment	316	Industrial Process Variable Instruments (Monitor)	$1,021
Investment	333	Electric Power & Specialty Transformer Manufacturing (Substation Costs & Intertie Wiring Costs)	$320,985
Investment	336	Relay & Industrial Control Manufacturing (Protective Relays Costs)	$47,099
Investment	341	Wiring Device Manufacturing (System Disconnect Costs)	$99,182
Investment	350	Motor Vehicle Parts Manufacturing (IC Low Engine & Engineer Wiring Costs)	$2,087,201
Investment	442	Computer Systems Design Services (Substation Telemetry Costs)	$10,025
Operating	485	Commercial Machinery Repair & Maintenance (Collection System Variable O&M, Compression System Variable O&M,)	$989,521

Table B.3. IMPLAN Expenditures for Landfill Gas

Type	IMPLAN Sector	IMPLAN Sector Description	Expenditures*
Depreciation	41	Other New Construction (Electricity Generation Installation & Other Costs, Gas Treatment Installation & Other Costs, Inter Connect Installation & Other Costs)	$204,200
Depreciation	205	Iron, Steel Pipe & Tube from Purchased Steel (Pipe)	$168,737
Depreciation	239	Metal Tank, Heavy Gauge, Manufacturing (Condensate Knockout)	$11,264
Depreciation	261	Oil & Gas Field Machinery & Equipment (Well & Well Heads)	$77,546
Depreciation	275	Air Purification Equipment Manufacturing (Filters)	$1,658
Depreciation	276	Industrial & Commercial Fan and Blower Manufacturing (Blowers)	$5,170
Depreciation	277	Heating Equipment, except Warm Air Furnaces (Radiator Costs)	$23,801
Depreciation	289	Air & Gas Compressor Manufacturing (Compressor)	$9,270
Depreciation	298	Industrial Process Furnace & Oven Manufacturing (Flares)	$7,634
Depreciation	316	Industrial Process Variable Instruments (Monitor)	$102
Depreciation	333	Electric Power & Specialty Transformer Manufacturing (Substation Costs & Intertie Wiring Costs)	$32,098
Depreciation	336	Relay & Industrial Control Manufacturing (Protective Relays Costs)	$4,710
Depreciation	341	Wiring Device Manufacturing (System Disconnect Costs)	$9,918
Depreciation	350	Motor Vehicle Parts Manufacturing (IC Low Engine & Engineer Wiring Costs)	$208,720

*2006 dollars

Expenditure Summary for Landfill Gas

Expenditure Type	Total $*	$/kWh
Investment	$7,658,297	$0.22
Operating	$989,521	$0.03
Depreciation	$764,827	$0.02

*2006 dollars

Conversion Technology: Co-fire (15%) of Cellulosic Residues (Wood Residues) with Coal
Facility Size (Co-fire Nameplate): 15.6 MW
Capacity Factor: 0.800
Generation/Year: 109,850,400 kWh/year
Total Industry Output: $ 11,479,218($0.1045/kWh)
Breakeven Total Industry Output: $12,448,826 ($0.1133/kWh)
Employees: 7
Source: English, B., J. Menard, M. Walsh, and K. Jensen. 2004. "Economic Impacts of Using Alternative Feedstocks in Coal-Fired Plants in the Southeastern United States".

Table B.4. IMPLAN Expenditures for: Co-fire (15%) of Cellulosic Residues (Wood Residues) with Coal

Type	IMPLAN Sector	IMPLAN Sector Description	Expenditures*
Investment	41	Other New Construction (Biomass Handling System Installation, Civil Structural, Electrical)	$2,346,421
Investment	232	Prefabricated Metal Buildings and Components (Wood Silo with Live Bottom)	$75,243
Investment	292	Conveyor & Conveying Equipment Manufacturing (Conveyor #1, Radial Stacker, Radial Screw, Conveyor #2, etc.)	$522,830
Investment	298	Industrial Process Furnace & Oven Manufacturing (Modification at Burners)	$34,209
Investment	316	Industrial Process Variable Instruments (Controls)	$165,213
Investment	346	Motor Vehicle Body Manufacturing (Truck Tipper with Hopper and Feeder)	$123,326
Investment	425	Banking (Contingency (30%))	$907,930
Investment	439	Architectural & Engineering Services (Engineering @ 10%)	$389,953
Operating	14	Logging (Feedstock)	$3,123,541
Operating	485	Commercial Machinery Repair & Maintenance	$282,178
Depreciation	41	Other New Construction (Biomass Handling System Installation, Civil Structural, Electrical)	$234,642
Depreciation	232	Prefabricated Metal Buildings and Components (Wood Silo with Live Bottom)	$3,762
Depreciation	292	Conveyor & Conveying Equipment Manufacturing (Conveyor #1, Radial Stacker, Radial Screw, Conveyor #2, etc.)	$52,283
Depreciation	298	Industrial Process Furnace & Oven Manufacturing (Modification at Burners)	$3,421
Depreciation	316	Industrial Process Variable Instruments (Controls)	$16,521
Depreciation	346	Motor Vehicle Body Manufacturing (Truck Tipper with Hopper and Feeder)	$12,333

*2006 dollars

Expenditure Summary for Co-fire (15%) of Cellulosic Residues (Wood Residues) with Coal

Expenditure Type	Total $*	$/kWh
Investment	$4,565,125	$0.04
Operating	$3,405,719	$0.03
Operating w/out Feedstock Expenditure	$282,178	$0.003
Depreciation	$322,962	$0.003

*2006 dollars

Conversion Technology: Wood Fired Power Plant
Facility Size (Nameplate): 25 MW
Capacity Factor: 0.800
Generation/Year: 175,200,000 kWh/year
Feedstock kWh/ton: 2,110.1
Total Industry Output: $18,308,400 ($0.1045/kWh)
Breakeven Total Industry Output: $24,664,685 ($0.1408/kWh)
Employees: 26
Source: Renewable Energy Technical Assessment Guide—TAG-RE: 2006. EPRI, Palo Alto, CA: 2007. 1012722

Table B.5. IMPLAN Expenditures for Wood Fired Power Plant

Type	IMPLAN Sector	IMPLAN Sector Description	Expenditures*
Investment	37	Manufacturing & Industrial Buildings (Concrete Substructures, Piping, Electrical, Insulation, Process Structural, Stack)	$11,863,878
Investment	161	Paint & Coating Manufacturing (Paint)	$148,500
Investment	203	Iron & Steel Mills (Structural Steel)	$4,198,787
Investment	240	Metal can, box, & Other Container Manufacturing (Receiving Hopper/Magnet, Reclaim Hopper, Feed Bin)	$22,892
Investment	259	Construction Machinery Manufacturing (Hammer Mill/Hopper, Dozer 1, & Dozer 2)	$1,164,724
Investment	273	Other Commercial & Service Industry Machinery Manufacturing (Demineralizer Plant)	$163,847
Investment	277	Heating Equipment, except Warm Air Furnaces (No. 2 Oil Burners (4X))	$617,701
Investment	278	AC, Refrigeration, & Forced Air Heating (Cooling Tower)	$2,649,048
Investment	285	Turbine & Turbine Generator Set Units Manufacturing (Stoker Steam Generator, Steam Turbine/Generator Set)	$17,510,303
Investment	292	Conveyor & Conveying Equipment Manufacturing (Rotary Disc Screen/Hopper, RDS Conveyor, HM Conveyor, Reclaim Conveyor, Feed Conveyor)	$246,019
Investment	315	Automatic Environmental Control Manufacturing (NOx Control _SNCR, CEMS)	$1,472,982
Investment	316	Industrial Process Variable Instruments (Instrumentation)	$2,121,239
Investment	346	Motor Vehicle Body Manufacturing (Truck Scale/Unloader)	$115,288
Investment	425	Banking (Contingency Fee)	$12,347,492
Investment	451	Management of Companies & Enterprises (Home Office Expense (w/Overhead), Field Expenses (w/Overhead), Contractor Fees)	$18,719,831
Operating	14	Logging (Feedstock)	$4,981,724

Table B.5. IMPLAN Expenditures for Wood Fired Power Plant

Type	IMPLAN Sector	IMPLAN Sector Description	Expenditures*
Operating	485	Commercial Machinery Repair & Maintenance (Maintenance)	$2,348,845
Depreciation	37	Manufacturing & Industrial Buildings (Concrete Substructures, Piping, Electrical, Insulation, Process Structural, Stack)	$593,194
Depreciation	161	Paint & Coating Manufacturing (Paint)	$14,850
Depreciation	203	Iron & Steel Mills (Structural Steel)	$209,939
Depreciation	240	Metal can, box, & Other Container Manufacturing (Receiving Hopper/Magnet, Reclaim Hopper, Feed Bin)	$2,289
Depreciation	259	Construction Machinery Manufacturing (Hammer Mill/Hopper, Dozer 1, & Dozer 2)	$116,472
Depreciation	273	Other Commercial & Service Industry Machinery Manufacturing (Demineralizer Plant)	$16,385
Depreciation	277	Heating Equipment, except Warm Air Furnaces (No. 2 Oil Burners (4X))	$61,770
Depreciation	278	AC, Refrigeration, & Forced Air Heating (Cooling Tower)	$264,905
Depreciation	285	Turbine & Turbine Generator Set Units Manufacturing (Stoker Steam Generator, Steam Turbine/Generator Set)	$1,751,030
Depreciation	292	Conveyor & Conveying Equipment Manufacturing (Rotary Disc Screen/Hopper, RDS Conveyor, HM Conveyor, Reclaim Conveyor, Feed Conveyor)	$24,602
Depreciation	315	Automatic Environmental Control Manufacturing (NOx Control _SNCR, CEMS)	$147,298
Depreciation	316	Industrial Process Variable Instruments (Instrumentation)	$212,124
Depreciation	346	Motor Vehicle Body Manufacturing (Truck Scale/Unloader)	$11,529

*2006 dollars

Expenditure Summary for Wood Fired Power Plant

Expenditure Type	Total $*	$/kWh
Investment	$73,362,531	$0.42
Operating	$7,330,570	$0.04
Operating w/out Feedstock Expenditure	$2,348,845	$0.01
Depreciation	$3,426,388	$0.02

*2006 dollars

Conversion Technology: Dedicated Energy Crop Fired Power Plant
Facility Size (Nameplate): 25 MW
Capacity Factor: 0.800
Generation/Year: 175,200,000 kWh/year
Feedstock kWh/ton: 1,885.1
Total Industry Output: $18,308,400 ($0.1045/kWh)
Breakeven Total Industry Output: $26,188,632 ($0.1495/kWh)
Employees: 26
Source: Renewable Energy Technical Assessment Guide—TAG-RE: 2006. EPRI, Palo Alto, CA: 2007. 1012722

Table B.6. IMPLAN Expenditures for Dedicated Energy Crop Fired Power Plant

Type	IMPLAN Sector	IMPLAN Sector Description	Expenditures*
Investment	37	Manufacturing & Industrial Buildings (Concrete Substructures, Piping, Electrical, Insulation, Process Structural, Stack)	$11,863,878
Investment	161	Paint & Coating Manufacturing (Paint)	$148,500
Investment	203	Iron & Steel Mills (Structural Steel)	$4,198,787
Investment	240	Metal can, box, & Other Container Manufacturing (Receiving Hopper/Magnet, Reclaim Hopper, Feed Bin)	$22,892
Investment	259	Construction Machinery Manufacturing (Hammer Mill/Hopper, Dozer 1, & Dozer 2)	$1,164,724
Investment	273	Other Commercial & Service Industry Machinery Manufacturing (Demineralizer Plant)	$163,847
Investment	277	Heating Equipment, except Warm Air Furnaces (No. 2 Oil Burners (4X))	$617,701
Investment	278	AC, Refrigeration, & Forced Air Heating (Cooling Tower)	$2,649,048
Investment	285	Turbine & Turbine Generator Set Units Manufacturing (Stoker Steam Generator, Steam Turbine/Generator Set)	$17,510,303
Investment	292	Conveyor & Conveying Equipment Manufacturing (Rotary Disc Screen/Hopper, RDS Conveyor, HM Conveyor, Reclaim Conveyor, Feed Conveyor)	$246,019
Investment	315	Automatic Environmental Control Manufacturing (NOx Control _SNCR, CEMS)	$1,472,982
Investment	316	Industrial Process Variable Instruments (Instrumentation)	$2,121,239
Investment	346	Motor Vehicle Body Manufacturing (Truck Scale/Unloader)	$115,288
Investment	425	Banking (Contingency Fee)	$12,347,492
Investment	451	Management of Companies & Enterprises (Home Office Expense (w/Overhead), Field Expenses (w/Overhead), Contractor Fees)	$18,719,831
Operating	22	Dedicated Energy Crop (Feedstock)	$6,505,672

Table B.6. IMPLAN Expenditures for Dedicated Energy Crop Fired Power Plant

Type	IMPLAN Sector	IMPLAN Sector Description	Expenditures*
Operating	485	Commercial Machinery Repair & Maintenance (Maintenance)	$2,348,845
Depreciation	37	Manufacturing & Industrial Buildings (Concrete Substructures, Piping, Electrical, Insulation, Process Structural, Stack)	$593,194
Depreciation	161	Paint & Coating Manufacturing (Paint)	$14,850
Depreciation	203	Iron & Steel Mills (Structural Steel)	$209,939
Depreciation	240	Metal can, box, & Other Container Manufacturing (Receiving Hopper/Magnet, Reclaim Hopper, Feed Bin)	$2,289
Depreciation	259	Construction Machinery Manufacturing (Hammer Mill/Hopper, Dozer 1, & Dozer 2)	$116,472
Depreciation	273	Other Commercial & Service Industry Machinery Manufacturing (Demineralizer Plant)	$16,385
Depreciation	277	Heating Equipment, except Warm Air Furnaces (No. 2 Oil Burners (4X))	$61,770
Depreciation	278	AC, Refrigeration, & Forced Air Heating (Cooling Tower)	$264,905
Depreciation	285	Turbine & Turbine Generator Set Units Manufacturing (Stoker Steam Generator, Steam Turbine/Generator Set)	$1,751,030
Depreciation	292	Conveyor & Conveying Equipment Manufacturing (Rotary Disc Screen/Hopper, RDS Conveyor, HM Conveyor, Reclaim Conveyor, Feed Conveyor)	$24,602
Depreciation	315	Automatic Environmental Control Manufacturing (NOx Control _SNCR, CEMS)	$147,298
Depreciation	316	Industrial Process Variable Instruments (Instrumentation)	$212,124
Depreciation	346	Motor Vehicle Body Manufacturing (Truck Scale/Unloader)	$11,529

*2006 dollars

Expenditure Summary for Dedicated Energy Crop Fired Power Plant

Expenditure Type	Total $*	$/kWh
Investment	$73,362,531	$0.42
Operating	$8,854,518	$0.05
Operating w/out Feedstock Expenditure	$2,348,845	$0.01
Depreciation	$3,426,388	$0.02

*2006 dollars

Conversion Technology: Citrus Waste Fired Power Plant
Facility Size (Nameplate): 25 MW
Capacity Factor: 0.800
Generation/Year: 175,200,000 kWh/year
Feedstock kWh/ton: 1,751.4
Total Industry Output: $18,308,400 ($0.1045/kWh)
Breakeven Total Industry Output: $25,685,038 ($0.1466/kWh)
Employees: 26
Source: Renewable Energy Technical Assessment Guide—TAG-RE: 2006. EPRI, Palo Alto, CA: 2007. 1012722

Table B.7. IMPLAN Expenditures for Citrus Waste Fired Power Plant

Type	IMPLAN Sector	IMPLAN Sector Description	Expenditures*
Investment	37	Manufacturing & Industrial Buildings (Concrete Substructures, Piping, Electrical, Insulation, Process Structural, Stack)	$11,863,878
Investment	161	Paint & Coating Manufacturing (Paint)	$148,500
Investment	203	Iron & Steel Mills (Structural Steel)	$4,198,787
Investment	240	Metal can, box, & Other Container Manufacturing (Receiving Hopper/Magnet, Reclaim Hopper, Feed Bin)	$22,892
Investment	259	Construction Machinery Manufacturing (Hammer Mill/Hopper, Dozer 1, & Dozer 2)	$1,164,724
Investment	273	Other Commercial & Service Industry Machinery Manufacturing (Demineralizer Plant)	$163,847
Investment	277	Heating Equipment, except Warm Air Furnaces (No. 2 Oil Burners (4X))	$617,701
Investment	278	AC, Refrigeration, & Forced Air Heating (Cooling Tower)	$2,649,048
Investment	285	Turbine & Turbine Generator Set Units Manufacturing (Stoker Steam Generator, Steam Turbine/Generator Set)	$17,510,303
Investment	292	Conveyor & Conveying Equipment Manufacturing (Rotary Disc Screen/Hopper, RDS Conveyor, HM Conveyor, Reclaim Conveyor, Feed Conveyor)	$246,019
Investment	315	Automatic Environmental Control Manufacturing (NOx Control _SNCR, CEMS)	$1,472,982
Investment	316	Industrial Process Variable Instruments (Instrumentation)	$2,121,239
Investment	346	Motor Vehicle Body Manufacturing (Truck Scale/Unloader)	$115,288
Investment	425	Banking (Contingency Fee)	$12,347,492
Investment	451	Management of Companies & Enterprises (Home Office Expense (w/Overhead), Field Expenses (w/Overhead), Contractor Fees)	$18,719,831
Operating	5	Citrus Waste (Feedstock)	$6,002,078

Table B.7. IMPLAN Expenditures for Citrus Waste Fired Power Plant

Type	IMPLAN Sector	IMPLAN Sector Description	Expenditures*
Operating	485	Commercial Machinery Repair & Maintenance (Maintenance)	$2,348,845
Depreciation	37	Manufacturing & Industrial Buildings (Concrete Substructures, Piping, Electrical, Insulation, Process Structural, Stack)	$593,194
Depreciation	161	Paint & Coating Manufacturing (Paint)	$14,850
Depreciation	203	Iron & Steel Mills (Structural Steel)	$209,939
Depreciation	240	Metal can, box, & Other Container Manufacturing (Receiving Hopper/Magnet, Reclaim Hopper, Feed Bin)	$2,289
Depreciation	259	Construction Machinery Manufacturing (Hammer Mill/Hopper, Dozer 1, & Dozer 2)	$116,472
Depreciation	273	Other Commercial & Service Industry Machinery Manufacturing (Demineralizer Plant)	$16,385
Depreciation	277	Heating Equipment, except Warm Air Furnaces (No. 2 Oil Burners (4X))	$61,770
Depreciation	278	AC, Refrigeration, & Forced Air Heating (Cooling Tower)	$264,905
Depreciation	285	Turbine & Turbine Generator Set Units Manufacturing (Stoker Steam Generator, Steam Turbine/Generator Set)	$1,751,030
Depreciation	292	Conveyor & Conveying Equipment Manufacturing (Rotary Disc Screen/Hopper, RDS Conveyor, HM Conveyor, Reclaim Conveyor, Feed Conveyor)	$24,602
Depreciation	315	Automatic Environmental Control Manufacturing (NOx Control _SNCR, CEMS)	$147,298
Depreciation	316	Industrial Process Variable Instruments (Instrumentation)	$212,124
Depreciation	346	Motor Vehicle Body Manufacturing (Truck Scale/Unloader)	$11,529

*2006 dollars

Expenditure Summary for Citrus Waste Fired Power Plant

Expenditure Type	Total $*	$/kWh
Investment	$73,362,531	$0.42
Operating	$8,350,923	$0.05
Operating w/out Feedstock Expenditure	$2,348,845	$0.01
Depreciation	$3,426,388	$0.02

*2006 dollars

Conversion Technology: High Pressure, Direct Gasification of Municipal Solid Waste Power Plant
Facility Size (Nameplate): 100 MW
Capacity Factor: 0.800
Generation/Year: 700,800,000 kWh/year
Feedstock kWh/ton: 769.2
Total Industry Output: $73,233,600 ($0.1045/kWh)
Breakeven Total Industry Output: $194,560,784 ($0.2776/kWh)
Employees: 104
Source: U.S. Department of Energy and EPRI. 1997. "Renewable Energy Technology Characterizations". Prepared by Office of Utility Technologies, Energy Efficiency and Renewable Energy and EPRI. Topical Report – 109496.

Table B.8. IMPLAN Expenditures for Gasification of Municipal Solid Waste Power Plant

Type	IMPLAN Sector	IMPLAN Sector Description	Expenditures*
Investment	37	Manufacturing & Industrial Buildings (Turbine Building & General Plant Facilities)	$15,222,953
Investment	41	Other New Construction (Installation & Waste Pond, etc.)	$18,689,503
Investment	238	Power Boiler & Heat Exchanger Manufacturing (Gasifier)	$47,927,549
Investment	275	Air Purification Equipment Manufacturing (Hot Gas Cleanup)	$3,791,608
Investment	285	Turbine & Turbine Generator Set Units Manufacturing (Steam Turbine)	$26, 319,367
Investment	292	Conveyor & Conveying Equipment Manufacturing (Fuel Preparation (Screening, Hogged, Dried in Rotary Drum Dryer, & Conveyed to Storage Silo)	$12,378,801
Investment	425	Banking (Project/Process Contingency & Startup Costs)	$26,393,047
Investment	431	Real Estate (Land)	$876,422
Investment	439	Architectural & Engineering Services (Engineering Fee & Inventory Capital)	$14,747,645
Investment	442	Computer System Design Services (Balance of Plant & Control Systems)	$17,219,582
Operating	32	Waster, Sewage, & Other Systems (Water)	$58,942,930
Operating	196	Lime Manufacturing (Chemicals)	$37,299,015
Operating	460	Waste Management & Remediation Services (Ash/Solids Disposal)	$28,176,716
Operating	485	Commercial Machinery Repair & Maintenance	$1,082,369
Depreciation	37	Manufacturing & Industrial Buildings (Turbine Building & General Plant Facilities)	$761,148
Depreciation	41	Other New Construction (Installation & Waste Pond, etc.)	$1,868,950
Depreciation	238	Power Boiler & Heat Exchanger Manufacturing	$4,792,755

Table B.8. IMPLAN Expenditures for Gasification of Municipal Solid Waste Power Plant

Type	IMPLAN Sector	IMPLAN Sector Description	Expenditures*
		(Gasifier)	
Depreciation	275	Air Purification Equipment Manufacturing (Hot Gas Cleanup)	$379,161
Depreciation	285	Turbine & Turbine Generator Set Units Manufacturing (Steam Turbine)	$2,631,937
Depreciation	292	Conveyor & Conveying Equipment Manufacturing (Fuel Preparation (Screening, Hogged, Dried in Rotary Drum Dryer, & Conveyed to Storage Silo)	$1,237,880
Depreciation	431	Real Estate (Land)	$35,057
Depreciation	442	Computer System Design Services (Balance of Plant & Control Systems)	$1,721,958

*2006 dollars

Expenditure Summary for Gasification of Municipal Solid Waste Power Plant

Expenditure Type	Total $*	$/kWh
Investment	$183,566,477	$0.26
Operating	$125,501,030	$0.18
Depreciation	$13,428,846	$0.02

*2006 dollars

Conversion Technology: Poultry Litter Combustion (700,000 tons/year)
Facility Size (Nameplate): 55 MW
Capacity Factor: 0.800
Generation/Year: 385,440,000 kWh/year
Feedstock kWh/ton: 550.6
Total Industry Output: $40,278,480 ($0.1045/kWh)
Breakeven Total Industry Output: $67,760,280 ($0.1758/kWh)
Employees: 26
Source: Renewable Energy Technical Assessment Guide—TAG-RE: 2006. EPRI, Palo Alto, CA: 2007. 1012722; Frazier, Barnes & Associates, LLC. 2004. "Feasibility Study for Use of Poultry Litter to Create Biomass Energy Final Report." Prepared for Michigan Biomass Energy Program, Grant No.: PLA-03-32 and West Michigan Co-Gen LLC; La Capra Associates, Inc., GDS Associates, Inc., and Sustainable Energy Advantage, LLC. 2006. "Analysis of a Renewable Portfolio Standard for the State of North Carolina, Technical Report." Prepared for the North Carolina Utilities Commission.

Table B.9. IMPLAN Expenditures for Poultry Litter Combustion Plant

Type	IMPLAN Sector	IMPLAN Sector Description	Expenditures*
Investment	37	Manufacturing & Industrial Buildings (Concrete Substructures, Piping, Electrical, Insulation, Process Structural, Stack)	$40,130,990
Investment	161	Paint & Coating Manufacturing (Paint)	$502,320
Investment	203	Iron & Steel Mills (Structural Steel)	$14,202,901
Investment	240	Metal can, box, & Other Container Manufacturing (Receiving Hopper/Magnet, Reclaim Hopper, Feed Bin)	$77,433
Investment	259	Construction Machinery Manufacturing (Hammer Mill/Hopper, Dozer 1, & Dozer 2)	$3,939,817
Investment	273	Other Commercial & Service Industry Machinery Manufacturing (Demineralizer Plant)	$554,231
Investment	277	Heating Equipment, except Warm Air Furnaces (No. 2 Oil Burners (4X))	$2,089,449
Investment	278	AC, Refrigeration, & Forced Air Heating (Cooling Tower)	$8,960,721
Investment	285	Turbine & Turbine Generator Set Units Manufacturing (Stoker Steam Generator, Steam Turbine/Generator Set)	$59,230,697
Investment	292	Conveyor & Conveying Equipment Manufacturing (Rotary Disc Screen/Hopper, RDS Conveyor, HM Conveyor, Reclaim Conveyor, Feed Conveyor)	$832,190
Investment	315	Automatic Environmental Control Manufacturing (NOx Control _SNCR, CEMS)	$4,982,538
Investment	316	Industrial Process Variable Instruments (Instrumentation)	$7,175,346
Investment	346	Motor Vehicle Body Manufacturing (Truck Scale/Unloader)	$389,975

Table B.9. IMPLAN Expenditures for Poultry Litter Combustion Plant

Type	IMPLAN Sector	IMPLAN Sector Description	Expenditures*
Investment	425	Banking (Contingency Fee)	$37,973,192
Investment	451	Management of Companies & Enterprises (Home Office Expense (w/Overhead), Field Expenses (w/Overhead), Contractor Fees)	$63,322,070
Operating	12	Poultry Litter (Feedstock)	$14,000,000
Operating	485	Commercial Machinery Repair & Maintenance (Maintenance)	$11,573,114
Depreciation	37	Manufacturing & Industrial Buildings (Concrete Substructures, Piping, Electrical, Insulation, Process Structural, Stack)	$2,006,550
Depreciation	161	Paint & Coating Manufacturing (Paint)	$50,232
Depreciation	203	Iron & Steel Mills (Structural Steel)	$710,145
Depreciation	240	Metal can, box, & Other Container Manufacturing (Receiving Hopper/Magnet, Reclaim Hopper, Feed Bin)	$7,743
Depreciation	259	Construction Machinery Manufacturing (Hammer Mill/Hopper, Dozer 1, & Dozer 2)	$393,982
Depreciation	273	Other Commercial & Service Industry Machinery Manufacturing (Demineralizer Plant)	$55,423
Depreciation	277	Heating Equipment, except Warm Air Furnaces (No. 2 Oil Burners (4X))	$208,945
Depreciation	278	AC, Refrigeration, & Forced Air Heating (Cooling Tower)	$896,072
Depreciation	285	Turbine & Turbine Generator Set Units Manufacturing (Stoker Steam Generator, Steam Turbine/Generator Set)	$5,923,070
Depreciation	292	Conveyor & Conveying Equipment Manufacturing (Rotary Disc Screen/Hopper, RDS Conveyor, HM Conveyor, Reclaim Conveyor, Feed Conveyor)	$83,219
Depreciation	315	Automatic Environmental Control Manufacturing (NOx Control _SNCR, CEMS)	$498,254
Depreciation	316	Industrial Process Variable Instruments (Instrumentation)	$717,535
Depreciation	346	Motor Vehicle Body Manufacturing (Truck Scale/Unloader)	$38,998
Byproduct	30	Power Generation & Supply (Electricity Revenue)	$26,362,773
Byproduct	32	Water, Sewage, & Other Systems (Steam Revenue)	$10,096,163
Byproduct	157	Phosphatic Fertilizer Manufacturing (Ash Revenues)	$7,294,451

*2006 dollars

Expenditure Summary for Poultry Litter Combustion Plant (700,000 tons per year)

Expenditure Type	Total $*	$/kWh
Investment	$244,363,869	$0.63
Operating	$25,573,114	$0.07
Operating w/out Feedstock Expenditure	$11,573,114	$0.03
Depreciation	$11,590,166	$0.03
Byproducts	$43,753,387	$0.11

*2006 dollars

Conversion Technology: Methane Digester for Poultry (40,000 head)
Facility Size (Nameplate): 0.05 MW
Capacity Factor: 0.630
Generation/Year: 275,940 kWh/year
Total Industry Output: $28,836 ($0.1045/kWh)
Breakeven Total Industry Output: $58,872 ($0.2134/kWh)
Employees: 1
Source: Moser, M., R. Mattocks, S. Gettier, and K. Roos. 1998. "Benefits, Costs and Operating Experience at Seven New Agricultural Anaerobic Digesters". Presented at Bioenergy '98, Expanding Bioenergy Partnerships, Madison, Wisconsin, October 4-8.

Table B.10. IMPLAN Expenditures for Methane Digester for Poultry (40,000 head).

Type	IMPLAN Sector	IMPLAN Sector Description	Expenditures
Investment	41	Other New Construction (Excavation, Engine-generator building, heat loop, electrical)	$120,971
Investment	101	Textile Bag & Canvas Mills (Digester Cover)	$65,615
Investment	173	Plastic Pipe, Fittings, and Profile Shapes (Manure Transfer Pipe)	$4,826
Investment	277	Heating Equipment, except Warm Air Furnaces (Gas/hot water piping, boiler & hot water storage, hot water use equipment)	$31,471
Investment	288	Pump & Pumping Equipment Manufacturing (Gas pump, meter)	$4,019
Investment	333	Electric Power & Specialty Transformer Manufacturing (Engine-generator)	$106,683
Investment	439	Architectural & Engineering Services (Engineering)	$30,470
Operating	485	Commercial Machinery Repair & Maintenance (Engine Maintenance)	$19,389
Depreciation	41	Other New Construction (Excavation, Engine-generator building, heat loop, electrical)	$6,049
Depreciation	101	Textile Bag & Canvas Mills (Digester Cover)	$6,562
Depreciation	173	Plastic Pipe, Fittings, and Profile Shapes (Manure Transfer Pipe)	$483
Depreciation	277	Heating Equipment, except Warm Air Furnaces (Gas/hot water piping, boiler & hot water storage, hot water use equipment)	$3,147
Depreciation	288	Pump & Pumping Equipment Manufacturing (Gas pump, meter)	$402
Depreciation	333	Electric Power & Specialty Transformer Manufacturing (Engine-generator)	$10,668
Byproduct	30	Power Generation & Supply (Electricity)	$48,839
Byproduct	142	Petroleum Refineries (Value of reduced propane use)	$31,149

*2006 dollars

Expenditure Summary for Methane Digester for Poultry (40,000 head)

Expenditure Type	Total $	$/kWh
Investment	$364,056	$1.32
Operating	$19,389	$0.07
Depreciation	$27,310	$0.10
Byproducts	$79,988	$0.29

*2006 dollars

Conversion Technology: Methane Digester for Dairy (1,000 head)
Facility Size (Nameplate): 0.12 MW
Capacity Factor: 0.630
Generation/Year: 680,400 kWh/year
Total Industry Output: $71,102 ($0.1045/kWh)
Breakeven Total Industry Output: N/A (Profitable)
Employees: 1
Source: Nelson, C. and J. Lamb. 2002. "Final Report: Haubenschild Farms Anaerobic Digester Updated". The Minnesota Project 2002.

Table B.11. IMPLAN Expenditures for Methane Digester for Dairy (1,000 head).

Type	IMPLAN Sector	IMPLAN Sector Description	Expenditures
Investment	41	Other New Construction (Cement Work, Piping Installation, Excavating/Grading, Building, Component Installation)	$103,542
Investment	101	Textile Bag & Canvas Mills (Cover)	$8,978
Investment	239	Metal Tank, Heavy Gauge, Manufacturing (Digester Tank)	$119,889
Investment	277	Heating Equipment, except Warm Air Furnaces (Heating & Gas Pipes)	$25,727
Investment	288	Pump & Pumping Equipment Manufacturing (Manure Pump & Gas Pump/Meter)	$16,210
Investment	333	Electric Power & Specialty Transformer Manufacturing (Engine-generator/hot water recovery)	$125,456
Investment	439	Architectural & Engineering Services (Engineering)	$46,691
Operating	485	Commercial Machinery Repair & Maintenance (Engine Maintenance)	$18,251
Depreciation	41	Other New Construction (Cement Work, Piping Installation, Excavating/Grading, Building, Component Installation)	$5,177
Depreciation	101	Textile Bag & Canvas Mills (Cover)	$898
Depreciation	239	Metal Tank, Heavy Gauge, Manufacturing (Digester Tank)	$11,989
Depreciation	277	Heating Equipment, except Warm Air Furnaces (Heating & Gas Pipes)	$2,573
Depreciation	288	Pump & Pumping Equipment Manufacturing (Manure Pump & Gas Pump/Meter)	$1,621
Depreciation	333	Electric Power & Specialty Transformer Manufacturing (Engine-generator/hot water recovery)	$12,546
Byproduct	30	Power Generation & Supply (Electricity)	$110,615
Byproduct	142	Petroleum Refineries (Offset Heating Costs - Propane)	$12,970

*2006 dollars

Expenditure Summary for Methane Digester for Dairy (1,000 head)

Expenditure Type	Total $	$/kWh
Investment	$446,493	$0.66
Operating	$18,251	$0.03
Depreciation	$34,803	$0.05
Byproduct	$123,585	$0.18

*2006 dollars

APPENDIX C
ECONOMIC IMPACTS FROM ADDITIONAL RENEWABLE ENERGY FACILITIES

Table C.1. Total Industry Output From Investment in Additional Renewable Electricity Under the Markey and 20% RESs*

BEA Region/State	The 25% RES		The 20% RES	
	2015			
	Direct	Total	Direct	Total
Gainesville	$534,908,180	$919,263,382	$535,578,133	$920,402,576
Jacksonville	$160,456,498	$304,132,481	$160,456,498	$304,132,481
Miami-Fort Lauderdale-Miami Beach	$2,539,130,002	$5,382,657,380	$2,539,118,087	$5,382,634,595
Orlando-The Villages	$1,373,120,219	$2,874,586,972	$1,373,120,219	$2,874,586,972
Panama City-Lynn Haven	$121,105,800	$205,450,745	$121,105,800	$205,450,745
Pensacola-Ferry Pass-Brent	$124,615,736	$228,869,654	$124,615,736	$228,869,654
Sarasota-Bradenton-Venice	$1,554,789,126	$3,105,570,811	$1,554,789,126	$3,105,570,811
Tallahassee	$195,649,328	$334,441,464	$195,649,328	$334,441,464
Tampa-St. Petersburg-Clearwater	$325,145,153	$672,284,381	$325,145,153	$672,284,381
Florida	$7,539,416,115	$16,660,660,445	$7,540,486,443	$16,662,759,735
	2020			
	Direct	Total	Direct	Total
Gainesville	$387,938,178	$666,821,171	$387,938,178	$666,821,171
Jacksonville	$209,440,893	$395,492,773	$209,440,893	$395,492,773
Miami-Fort Lauderdale-Miami Beach	$1,305,683,710	$2,772,123,423	$1,305,683,710	$2,772,123,423
Orlando-The Villages	$942,144,456	$1,963,335,556	$942,144,456	$1,963,335,556
Panama City-Lynn Haven	$294,701,440	$495,665,042	$294,701,440	$495,665,042
Pensacola-Ferry Pass-Brent	$264,338,412	$477,043,254	$264,338,412	$477,043,254
Sarasota-Bradenton-Venice	$877,612,370	$1,740,756,319	$877,612,370	$1,740,756,319
Tallahassee	$0	$0	$0	$0
Tampa-St. Petersburg-Clearwater	$308,807,455	$628,459,807	$308,807,455	$628,459,807
Florida	$5,275,443,123	$11,377,580,737	$5,275,443,123	$11,377,580,737
	2025			
	Direct	Total	Direct	Total
Gainesville	$319,039,811	$549,645,172	$319,039,811	$549,645,172
Jacksonville	$14,812,590	$27,971,006	$14,812,590	$27,971,006
Miami-Fort Lauderdale-Miami Beach	$388,691,196	$859,808,781	$388,691,196	$859,808,781
Orlando-The Villages	$552,179,751	$1,207,161,200	$552,179,751	$1,207,161,200
Panama City-Lynn Haven	$234,100,970	$393,945,408	$234,100,970	$393,945,408
Pensacola-Ferry Pass-Brent	$214,209,718	$387,467,945	$214,209,718	$387,467,945
Sarasota-Bradenton-Venice	$122,452,882	$246,582,917	$122,452,882	$246,582,917
Tallahassee	$0	$0	$0	$0
Tampa-St. Petersburg-Clearwater	$108,784,897	$242,403,767	$108,784,897	$242,403,767
Florida	$2,392,955,245	$5,277,447,755	$2,392,955,245	$5,277,447,755

* The Florida numbers are greater than the sum of the BEA regions. This is due to interregional trade. All dollar value impacts are in $2009.

Table C.2. Employment From Investment in Additional Renewable Electricity Under The Markey and 20% RESs*

BEA Region/State	The 25% RES		The 20% RES	
		2015		
	Direct	Total	Direct	Total
Gainesville	3,336	6,959	3,341	6,969
Jacksonville	733	1,898	733	1,898
Miami-Fort Lauderdale-Miami Beach	12,084	34,127	12,084	34,127
Orlando-The Villages	5,626	17,474	5,626	17,474
Panama City-Lynn Haven	731	1,534	731	1,534
Pensacola-Ferry Pass-Brent	500	1,378	500	1,378
Sarasota-Bradenton-Venice	8,952	21,963	8,952	21,963
Tallahassee	1,366	2,660	1,366	2,660
Tampa-St. Petersburg-Clearwater	1,430	4,251	1,430	4,251
Florida	33,475	103,444	33,480	103,457
		2020		
	Direct	Total	Direct	Total
Gainesville	2,427	5,058	2,427	5,058
Jacksonville	1,484	3,045	1,484	3,045
Miami-Fort Lauderdale-Miami Beach	6,155	17,523	6,155	17,523
Orlando-The Villages	3,895	11,965	3,895	11,965
Panama City-Lynn Haven	2,006	3,921	2,006	3,921
Pensacola-Ferry Pass-Brent	1,397	3,319	1,397	3,319
Sarasota-Bradenton-Venice	5,593	12,902	5,593	12,902
Tallahassee	0	0	0	0
Tampa-St. Petersburg-Clearwater	1,512	4,109	1,512	4,109
Florida	24,242	71,340	24,242	71,340
		2025		
	Direct	Total	Direct	Total
Gainesville	1,911	4,073	1,911	4,073
Jacksonville	105	215	105	215
Miami-Fort Lauderdale-Miami Beach	887	4,432	887	4,432
Orlando-The Villages	1,710	6,717	1,710	6,717
Panama City-Lynn Haven	1,567	3,089	1,567	3,089
Pensacola-Ferry Pass-Brent	1,098	2,651	1,098	2,651
Sarasota-Bradenton-Venice	454	1,451	454	1,451
Tallahassee	0	0	0	0
Tampa-St. Petersburg-Clearwater	262	1,353	262	1,353
Florida	8,237	29,724	8,237	29,724

* The Florida numbers are greater than the sum of the BEA regions. This is due to interregional trade.

Table C.3. Value-Added From Investment in Additional Renewable Electricity Under The Markey and 20% RESs*

BEA Region/State	The 25% RES		The 20% RES	
		2015		
	Direct	Total	Direct	Total
Gainesville	$229,915,737	$445,753,138	$230,260,920	$446,366,394
Jacksonville	$76,412,759	$160,799,206	$76,412,759	$160,799,206
Miami-Fort Lauderdale-Miami Beach	$952,668,206	$2,640,779,557	$952,662,979	$2,640,767,890
Orlando-The Villages	$535,754,497	$1,377,820,138	$535,754,497	$1,377,820,138
Panama City-Lynn Haven	$50,994,826	$100,345,304	$50,994,826	$100,345,304
Pensacola-Ferry Pass-Brent	$42,249,971	$102,294,298	$42,249,971	$102,294,298
Sarasota-Bradenton-Venice	$645,860,751	$1,564,360,266	$645,860,751	$1,564,360,266
Tallahassee	$107,617,844	$190,023,312	$107,617,844	$190,023,312
Tampa-St. Petersburg-Clearwater	$104,422,267	$306,403,027	$104,422,267	$306,403,027
Florida	$2,994,394,076	$8,198,789,892	$2,994,893,598	$8,199,886,862
		2020		
	Direct	Total	Direct	Total
Gainesville	$168,119,047	$324,825,072	$168,119,047	$324,825,072
Jacksonville	$102,834,872	$212,716,597	$102,834,872	$212,716,597
Miami-Fort Lauderdale-Miami Beach	$468,525,211	$1,338,303,914	$468,525,211	$1,338,303,914
Orlando-The Villages	$369,158,766	$942,067,366	$369,158,766	$942,067,366
Panama City-Lynn Haven	$146,284,670	$264,208,131	$146,284,670	$264,208,131
Pensacola-Ferry Pass-Brent	$125,656,781	$249,968,210	$125,656,781	$249,968,210
Sarasota-Bradenton-Venice	$386,023,110	$898,001,532	$386,023,110	$898,001,532
Tallahassee	$0	$0	$0	$0
Tampa-St. Petersburg-Clearwater	$110,380,558	$296,559,669	$110,380,558	$296,559,669
Florida	$2,143,157,970	$5,633,116,716	$2,143,157,970	$5,633,116,716
		2025		
	Direct	Total	Direct	Total
Gainesville	$132,496,143	$261,597,289	$132,496,143	$261,597,289
Jacksonville	$7,272,939	$15,044,263	$7,272,939	$15,044,263
Miami-Fort Lauderdale-Miami Beach	$64,470,383	$340,977,868	$64,470,383	$340,977,868
Orlando-The Villages	$173,364,777	$535,422,806	$173,364,777	$535,422,806
Panama City-Lynn Haven	$114,296,607	$208,043,596	$114,296,607	$208,043,596
Pensacola-Ferry Pass-Brent	$98,544,851	$199,625,141	$98,544,851	$199,625,141
Sarasota-Bradenton-Venice	$35,111,194	$107,793,793	$35,111,194	$107,793,793
Tallahassee	$0	$0	$0	$0
Tampa-St. Petersburg-Clearwater	$19,409,233	$96,965,736	$19,409,233	$96,965,736
Florida	$809,410,919	$2,439,922,791	$809,410,919	$2,439,922,791

* The Florida numbers are greater than the sum of the BEA regions. This is due to interregional trade. All dollar value impacts are in $2009.

Table C.4. Total Industry Output From Year-to-Year Operations of Additional Renewable Electricity Under The Markey and Bingaman Proposals*

BEA Region/State	The 25% RES		The 20% RES	
		2015		
	Direct	Total	Direct	Total
Gainesville	$224,196,256	$389,083,907	$224,488,008	$389,564,405
Jacksonville	$56,756,915	$102,411,411	$56,756,915	$102,411,411
Miami-Fort Lauderdale-Miami Beach	$828,420,598	$1,499,734,248	$828,418,722	$1,499,730,689
Orlando-The Villages	$619,980,404	$1,173,935,579	$619,980,404	$1,173,935,579
Panama City-Lynn Haven	$93,400,170	$163,344,127	$93,098,020	$162,804,047
Pensacola-Ferry Pass-Brent	$50,418,301	$89,028,634	$50,418,301	$89,028,634
Sarasota-Bradenton-Venice	$201,154,488	$289,570,927	$201,154,488	$289,570,927
Tallahassee	$106,897,626	$170,710,777	$106,897,626	$170,710,777
Tampa-St. Petersburg-Clearwater	$218,271,723	$437,795,224	$218,271,723	$437,795,224
Florida	$2,399,496,480	$4,939,532,215	$2,399,786,357	$4,940,076,970
		2020		
	Direct	Total	Direct	Total
Gainesville	$402,130,606	$700,043,102	$402,130,606	$700,043,102
Jacksonville	$295,044,414	$599,806,207	$295,044,414	$599,806,207
Miami-Fort Lauderdale-Miami Beach	$1,373,682,211	$2,504,208,559	$1,373,682,211	$2,504,208,559
Orlando-The Villages	$1,086,404,253	$2,066,466,291	$1,086,404,253	$2,066,466,291
Panama City-Lynn Haven	$246,996,596	$428,829,943	$246,996,596	$428,829,943
Pensacola-Ferry Pass-Brent	$168,744,872	$309,223,649	$168,744,872	$309,223,649
Sarasota-Bradenton-Venice	$641,375,851	$1,062,261,411	$641,375,851	$1,062,261,411
Tallahassee	$108,869,702	$172,968,866	$108,869,702	$172,968,866
Tampa-St. Petersburg-Clearwater	$458,927,640	$922,795,173	$458,927,640	$922,795,173
Florida	$4,781,316,873	$9,786,817,566	$4,781,316,873	$9,786,817,566
		2025		
	Direct	Total	Direct	Total
Gainesville	$541,790,091	$943,988,834	$542,081,843	$944,469,332
Jacksonville	$314,465,135	$638,124,219	$314,465,135	$638,124,219
Miami-Fort Lauderdale-Miami Beach	$1,452,616,300	$2,642,225,185	$1,452,614,424	$2,642,221,626
Orlando-The Villages	$1,239,402,934	$2,369,705,128	$1,239,402,934	$2,369,705,128
Panama City-Lynn Haven	$366,818,055	$635,745,063	$366,818,055	$635,745,063
Pensacola-Ferry Pass-Brent	$261,406,637	$481,330,118	$261,406,637	$481,330,118
Sarasota-Bradenton-Venice	$683,285,655	$1,134,401,282	$683,285,655	$1,134,401,282
Tallahassee	$110,841,779	$175,226,955	$110,841,779	$175,226,955
Tampa-St. Petersburg-Clearwater	$489,871,282	$981,370,334	$489,871,282	$981,370,334
Florida	$5,460,497,867	$11,173,588,864	$5,460,787,744	$11,174,133,618

* The Florida numbers are greater than the sum of the BEA regions. This is due to interregional trade. All dollar value impacts are in $2009.

Table C.5. Employment From Year-to-Year Operations of Additional Renewable Electricity Under The Markey and 20% RESs*

BEA Region/State	The 25% RES		The 20% RES	
		2015		
	Direct	Total	Direct	Total
Gainesville	206	1,559	206	1,560
Jacksonville	58	398	58	398
Miami-Fort Lauderdale-Miami Beach	553	5,313	553	5,313
Orlando-The Villages	369	4,291	369	4,291
Panama City-Lynn Haven	66	621	66	619
Pensacola-Ferry Pass-Brent	57	370	57	370
Sarasota-Bradenton-Venice	111	887	111	887
Tallahassee	104	633	104	633
Tampa-St. Petersburg-Clearwater	137	1,672	137	1,672
Florida	1,660	19,025	1,660	19,027
		2020		
	Direct	Total	Direct	Total
Gainesville	368	2,880	368	2,880
Jacksonville	178	2,259	178	2,259
Miami-Fort Lauderdale-Miami Beach	800	8,736	800	8,736
Orlando-The Villages	634	7,502	634	7,502
Panama City-Lynn Haven	209	1,699	209	1,699
Pensacola-Ferry Pass-Brent	165	1,306	165	1,306
Sarasota-Bradenton-Venice	311	3,572	311	3,572
Tallahassee	104	633	104	633
Tampa-St. Petersburg-Clearwater	256	3,502	256	3,502
Florida	3,024	37,584	3,024	37,584
		2025		
	Direct	Total	Direct	Total
Gainesville	494	3,907	494	3,909
Jacksonville	186	2,390	186	2,390
Miami-Fort Lauderdale-Miami Beach	827	9,115	827	9,115
Orlando-The Villages	734	8,518	734	8,518
Panama City-Lynn Haven	320	2,537	320	2,537
Pensacola-Ferry Pass-Brent	250	2,035	250	2,035
Sarasota-Bradenton-Venice	329	3,805	329	3,805
Tallahassee	104	633	104	633
Tampa-St. Petersburg-Clearwater	268	3,695	268	3,695
Florida	3,511	42,800	3,511	42,802

* The Florida numbers are greater than the sum of the BEA regions. This is due to interregional trade.

Table C.6. Value-Added From Year-to-Year Operations of Additional Renewable Electricity Under The Markey and 20% RESs*

BEA Region/State	The 25% RES		The 20% RES	
		2015		
	Direct	Total	Direct	Total
Gainesville	$117,409,725	$201,847,808	$117,541,526	$202,079,243
Jacksonville	$30,560,118	$54,395,222	$30,560,118	$54,395,222
Miami-Fort Lauderdale-Miami Beach	$280,264,095	$653,893,987	$280,263,618	$653,892,559
Orlando-The Villages	$234,507,722	$527,364,744	$234,507,722	$527,364,744
Panama City-Lynn Haven	$57,144,976	$95,959,858	$56,933,326	$95,637,456
Pensacola-Ferry Pass-Brent	$27,417,270	$50,954,788	$27,417,270	$50,954,788
Sarasota-Bradenton-Venice	$87,099,496	$137,492,288	$87,099,496	$137,492,288
Tallahassee	$59,275,523	$92,180,479	$59,275,523	$92,180,479
Tampa-St. Petersburg-Clearwater	$62,635,454	$180,972,046	$62,635,454	$180,972,046
Florida	$956,314,388	$2,284,040,151	$956,445,714	$2,284,310,763
		2020		
	Direct	Total	Direct	Total
Gainesville	$210,042,577	$381,264,810	$210,042,577	$381,264,810
Jacksonville	$98,468,637	$275,073,175	$98,468,637	$275,073,175
Miami-Fort Lauderdale-Miami Beach	$440,704,604	$1,068,580,025	$440,704,604	$1,068,580,025
Orlando-The Villages	$390,365,196	$914,529,112	$390,365,196	$914,529,112
Panama City-Lynn Haven	$138,188,292	$251,523,410	$138,188,292	$251,523,410
Pensacola-Ferry Pass-Brent	$89,329,792	$177,885,365	$89,329,792	$177,885,365
Sarasota-Bradenton-Venice	$219,401,168	$456,424,344	$219,401,168	$456,424,344
Tallahassee	$59,678,689	$92,761,906	$59,678,689	$92,761,906
Tampa-St. Petersburg-Clearwater	$130,938,435	$380,880,552	$130,938,435	$380,880,552
Florida	$1,776,774,120	$4,453,620,245	$1,776,774,120	$4,453,620,245
		2025		
	Direct	Total	Direct	Total
Gainesville	$282,349,189	$521,368,043	$282,480,990	$521,599,478
Jacksonville	$103,796,417	$291,534,607	$103,796,417	$291,534,607
Miami-Fort Lauderdale-Miami Beach	$461,767,721	$1,121,968,599	$461,767,245	$1,121,967,171
Orlando-The Villages	$450,581,875	$1,057,123,482	$450,581,875	$1,057,123,482
Panama City-Lynn Haven	$201,295,083	$372,627,099	$201,295,083	$372,627,099
Pensacola-Ferry Pass-Brent	$137,612,768	$276,835,893	$137,612,768	$276,835,893
Sarasota-Bradenton-Venice	$231,312,311	$485,260,312	$231,312,311	$485,260,312
Tallahassee	$60,081,854	$93,343,332	$60,081,854	$93,343,332
Tampa-St. Petersburg-Clearwater	$139,278,233	$404,084,689	$139,278,233	$404,084,689
Florida	$2,068,075,531	$5,139,652,537	$2,068,206,857	$5,139,923,149

* The Florida numbers are greater than the sum of the BEA regions. This is due to interregional trade. All dollar value impacts are in $2009.

Table C.7. Total Industry Output From Year-to-Year Operations Under the Two Federal Policy Scenarios, 2015, 2020, 2025

	The 25% RES			The 20% RES		
BEA Region/State	2015	2020	2025	2015	2020	2025
			Solar			
Gainesville	$13,273,379	$22,671,988	$32,070,596	$13,273,379	$22,671,988	$32,070,596
Jacksonville	$4,772,093	$8,151,114	$11,530,136	$4,772,093	$8,151,114	$11,530,136
Miami-Fort Lauderdale-Miami Beach	$44,954,985	$76,786,693	$108,618,401	$44,954,985	$76,786,693	$108,618,401
Orlando-The Villages	$73,857,205	$126,153,984	$178,450,763	$73,857,205	$126,153,984	$178,450,763
Panama City-Lynn Haven	$2,708,283	$4,625,962	$6,543,642	$2,708,283	$4,625,962	$6,543,642
Pensacola-Ferry Pass-Brent	$5,361,765	$9,158,322	$12,954,878	$5,361,765	$9,158,322	$12,954,878
Sarasota-Bradenton-Venice	$9,495,825	$16,219,626	$22,943,426	$9,495,825	$16,219,626	$22,943,426
Tallahassee	$3,189,033	$5,447,122	$7,705,211	$3,189,033	$5,447,122	$7,705,211
Tampa-St. Petersburg-Clearwater	$11,762,516	$20,091,314	$28,420,111	$11,762,516	$20,091,314	$28,420,111
Florida	$249,931,064	$426,902,149	$603,873,234	$249,931,064	$426,902,149	$603,873,234
			Solar Industrial			
Gainesville	$0	$0	$0	$0	$0	$0
Jacksonville	$0	$0	$0	$0	$0	$0
Miami-Fort Lauderdale-Miami Beach	$185,582,534	$268,539,299	$272,888,706	$185,582,534	$268,539,299	$272,888,706
Orlando-The Villages	$30,369,954	$45,959,809	$44,657,313	$30,369,954	$45,959,809	$44,657,313
Panama City-Lynn Haven	$0	$0	$0	$0	$0	$0
Pensacola-Ferry Pass-Brent	$0	$0	$0	$0	$0	$0
Sarasota-Bradenton-Venice	$180,911,893	$261,780,848	$266,020,792	$180,911,893	$261,780,848	$266,020,792
Tallahassee	$0	$0	$0	$0	$0	$0
Tampa-St. Petersburg-Clearwater	$0	$0	$0	$0	$0	$0
Florida	$647,832,946	$937,419,067	$952,602,010	$647,832,946	$937,419,067	$952,602,010
			Landfill Gas			
Gainesville	$0	$0	$0	$0	$0	$0
Jacksonville	$1,510,444	$1,510,444	$1,510,444	$1,510,444	$1,510,444	$1,510,444
Miami-Fort Lauderdale-Miami Beach	$36,437,254	$36,437,254	$36,437,254	$36,437,254	$36,437,254	$36,437,254
Orlando-The Villages	$0	$0	$0	$0	$0	$0
Panama City-Lynn Haven	$0	$0	$0	$0	$0	
Pensacola-Ferry Pass-Brent	$4,657,018	$4,657,018	$4,657,018	$4,657,018	$4,657,018	$4,657,018
Sarasota-Bradenton-Venice	$8,080,041	$8,080,041	$8,080,041	$8,080,041	$8,080,041	$8,080,041
Tallahassee	$0	$0	$0	$0	$0	$0
Tampa-St. Petersburg-Clearwater	$8,547,318	$8,547,318	$8,547,318	$8,547,318	$8,547,318	$8,547,318
Florida	$61,017,217	$61,017,217	$61,017,217	$61,017,217	$61,017,217	$61,017,217

* The Florida numbers are greater than the sum of the BEA regions. This is due to interregional trade. All dollar value impacts are in $2009.

Table C.7. Total Industry Output From Year-to-Year Operations Under the Two Federal Policy Scenarios, 2015, 2020, 2025, Continued

	The 25% RES			The 20% RES		
BEA Region/State	2015	2020	2025	2015	2020	2025
			Gasification Municipal Solid Waste			
Gainesville	$0	$0	$0	$0	$0	$0
Jacksonville	$0	$494,015,775	$528,954,766	$0	$494,015,775	$528,954,766
Miami-Fort Lauderdale-Miami Beach	$1,037,236,329	$1,926,922,166	$2,028,757,678	$1,037,236,329	$1,926,922,166	$2,028,757,678
Orlando-The Villages	$699,088,173	$1,339,974,701	$1,449,296,717	$699,088,173	$1,339,974,701	$1,449,296,717
Panama City-Lynn Haven	$0	$0	$0	$0	$0	
Pensacola-Ferry Pass-Brent	$0	$0	$0	$0	$0	$0
Sarasota-Bradenton-Venice	$0	$685,097,728	$746,273,856	$0	$685,097,728	$746,273,856
Tallahassee	$0	$0	$0	$0	$0	$0
Tampa-St. Petersburg-Clearwater	$417,485,390	$894,156,542	$944,402,905	$417,485,390	$894,156,542	$944,402,905
Florida	$2,260,771,995	$5,588,679,220	$5,964,435,772	$2,260,771,995	$5,588,679,220	$5,964,435,772
			Cofire Wood			
Gainesville	$0	$0	$0	$0	$0	$0
Jacksonville	$0	$0	$0	$0	$0	$0
Miami-Fort Lauderdale-Miami Beach	$0	$0	$0	$0	$0	$0
Orlando-The Villages	$83,144,414	$83,144,414	$83,144,414	$83,144,414	$83,144,414	$83,144,414
Panama City-Lynn Haven	$87,422,473	$87,422,473	$87,422,473	$86,882,394	$87,422,473	$87,422,473
Pensacola-Ferry Pass-Brent	$18,899,168	$18,899,168	$18,899,168	$18,899,168	$18,899,168	$18,899,168
Sarasota-Bradenton-Venice	$0	$0	$0	$0	$0	$0
Tallahassee	$0	$0	$0	$0	$0	$0
Tampa-St. Petersburg-Clearwater	$0	$0	$0	$0	$0	$0
Florida	$212,440,983	$212,440,983	$212,440,983	$212,440,983	$212,440,983	$212,440,983
			Direct Fire Citrus			
Gainesville	$0	$0	$0	$0	$0	$0
Jacksonville	$0	$0	$0	$0	$0	$0
Miami-Fort Lauderdale-Miami Beach	$194,042,384	$194,042,384	$194,042,384	$194,042,384	$194,042,384	$194,042,384
Orlando-The Villages	$236,432,070	$236,432,070	$236,432,070	$236,432,070	$236,432,070	$236,432,070
Panama City-Lynn Haven	$0	$0	$0	$0	$0	$0
Pensacola-Ferry Pass-Brent	$0	$0	$0	$0	$0	$0
Sarasota-Bradenton-Venice	$91,083,168	$91,083,168	$91,083,168	$91,083,168	$91,083,168	$91,083,168
Tallahassee	$0	$0	$0	$0	$0	$0
Tampa-St. Petersburg-Clearwater	$0	$0	$0	$0	$0	$0
Florida	$543,854,102	$543,854,102	$543,854,102	$543,854,102	$543,854,102	$543,854,102

Table C.7. Total Industry Output From Year-to-Year Operations Under the Two Federal Policy Scenarios, 2015, 2020, 2025, Continued

	The 25% RES			The 20% RES		
BEA Region/State	2015	2020	2025	2015	2020	2025
			Direct Fire Wood			
Gainesville	$229,240,055	$229,240,055	$229,240,055	$229,240,055	$229,240,055	$229,240,055
Jacksonville	$96,128,874	$96,128,874	$96,128,874	$96,128,874	$96,128,874	$96,128,874
Miami-Fort Lauderdale-Miami Beach	$0	$0	$0	$0	$0	$0
Orlando-The Villages	$0	$0	$0	$0	$0	$0
Panama City-Lynn Haven	$0	$0	$0	$0	$0	$0
Pensacola-Ferry Pass-Brent	$0	$0	$0	$0	$0	$0
Sarasota-Bradenton-Venice	$0	$0	$0	$0	$0	$0
Tallahassee	$167,521,744	$167,521,744	$167,521,744	$167,521,744	$167,521,744	$167,521,744
Tampa-St. Petersburg-Clearwater	$0	$0	$0	$0	$0	$0
Florida	$597,930,817	$597,930,817	$597,930,817	$597,930,817	$597,930,817	$597,930,817
			Direct Fire Dedicated Energy Crop			
Gainesville	$83,766,830	$385,327,416	$619,874,539	$83,766,830	$385,327,416	$619,874,539
Jacksonville	$0	$0	$0	$0	$0	$0
Miami-Fort Lauderdale-Miami Beach	$0	$0	$0	$0	$0	$0
Orlando-The Villages	$51,043,764	$234,801,313	$377,723,851	$51,043,764	$234,801,313	$377,723,851
Panama City-Lynn Haven	$73,213,371	$336,781,508	$541,778,947	$73,213,371	$336,781,508	$541,778,947
Pensacola-Ferry Pass-Brent	$60,110,683	$276,509,142	$444,819,054	$60,110,683	$276,509,142	$444,819,054
Sarasota-Bradenton-Venice	$0	$0	$0	$0	$0	$0
Tallahassee	$0	$0	$0	$0	$0	$0
Tampa-St. Petersburg-Clearwater	$0	$0	$0	$0	$0	$0
Florida	$292,450,256	$1,345,271,177	$2,164,131,893	$292,450,256	$1,345,271,177	$2,164,131,893
			Direct Fire Poultry Litter (Broilers)			
Gainesville	$60,756,622	$60,756,622	$60,756,622	$61,237,502	$61,237,502	$61,237,502
Jacksonville	$0	$0	$0	$0	$0	$0
Miami-Fort Lauderdale-Miami Beach	$0	$0	$0	$0	$0	$0
Orlando-The Villages	$0	$0	$0	$0	$0	$0
Panama City-Lynn Haven	$0	$0	$0	$0	$0	$0
Pensacola-Ferry Pass-Brent	$0	$0	$0	$0	$0	$0
Sarasota-Bradenton-Venice	$0	$0	$0	$0	$0	$0
Tallahassee	$0	$0	$0	$0	$0	$0
Tampa-St. Petersburg-Clearwater	$0	$0	$0	$0	$0	$0
Florida	$69,342,016	$69,342,016	$69,342,016	$69,890,849	$69,890,849	$69,890,849

Table C.7. Total Industry Output From Year-to-Year Operations Under the Two Federal Policy Scenarios, 2015, 2020, 2025, Continued

	The 25% RES			The 20% RES		
BEA Region/State	2015	2020	2025	2015	2020	2025
			Animal Methane Poultry (Layers)			
Gainesville	$252,912	$252,912	$252,912	$252,410	$252,410	$252,410
Jacksonville	$0	$0	$0	$0	$0	$0
Miami-Fort Lauderdale-Miami Beach	$0	$0	$0	$0	$0	$0
Orlando-The Villages	$0	$0	$0	$0	$0	$0
Panama City-Lynn Haven	$0	$0	$0	$0	$0	$0
Pensacola-Ferry Pass-Brent	$0	$0	$0	$0	$0	$0
Sarasota-Bradenton-Venice	$0	$0	$0	$0	$0	$0
Tallahassee	$0	$0	$0	$0	$0	$0
Tampa-St. Petersburg-Clearwater	$0	$0	$0	$0	$0	$0
Florida	$309,675	$309,675	$309,675	$309,061	$309,061	$309,061
			Animal Methane Dairy			
Gainesville	$1,794,109	$1,794,109	$1,794,109	$1,794,229	$1,794,229	$1,794,229
Jacksonville	$0	$0	$0	$0	$0	$0
Miami-Fort Lauderdale-Miami Beach	$1,480,762	$1,480,762	$1,480,762	$1,477,203	$1,477,203	$1,477,203
Orlando-The Villages	$0	$0	$0	$0	$0	$0
Panama City-Lynn Haven	$0	$0	$0	$0	$0	$0
Pensacola-Ferry Pass-Brent	$0	$0	$0	$0	$0	$0
Sarasota-Bradenton-Venice	$0	$0	$0	$0	$0	$0
Tallahassee	$0	$0	$0	$0	$0	$0
Tampa-St. Petersburg-Clearwater	$0	$0	$0	$0	$0	$0
Florida	$3,651,144	$3,651,144	$3,651,144	$3,647,681	$3,647,681	$3,647,681
			Total			
Gainesville	$389,083,907	$700,043,102	$943,988,834	$389,564,405	$700,523,601	$944,469,332
Jacksonville	$102,411,411	$599,806,207	$638,124,219	$102,411,411	$599,806,207	$638,124,219
Miami-Fort Lauderdale-Miami Beach	$1,499,734,248	$2,504,208,559	$2,642,225,185	$1,499,730,689	$2,504,204,999	$2,642,221,626
Orlando-The Villages	$1,173,935,579	$2,066,466,291	$2,369,705,128	$1,173,935,579	$2,066,466,291	$2,369,705,128
Panama City-Lynn Haven	$163,344,127	$428,829,943	$635,745,063	$162,804,047	$428,829,943	$635,745,063
Pensacola-Ferry Pass-Brent	$89,028,634	$309,223,649	$481,330,118	$89,028,634	$309,223,649	$481,330,118
Sarasota-Bradenton-Venice	$289,570,927	$1,062,261,411	$1,134,401,282	$289,570,927	$1,062,261,411	$1,134,401,282
Tallahassee	$170,710,777	$172,968,866	$175,226,955	$170,710,777	$172,968,866	$175,226,955
Tampa-St. Petersburg-Clearwater	$437,795,224	$922,795,173	$981,370,334	$437,795,224	$922,795,173	$981,370,334
Florida	$4,939,532,215	$9,786,817,566	$11,173,588,864	$4,940,076,970	$9,787,362,321	$11,174,133,618

Table C.8. Total Industry Output from Agricultural Feedstock Production Under the Two Federal Policy Scenarios, 2015, 2020, and 2025*

BEA Region/State	The 25% RES		The 20% RES	
			2015	
	Direct	Total	Direct	Total
Gainesville	$46,024,073	$69,493,447	$46,083,348	$69,574,717
Jacksonville	$11,375,852	$17,720,766	$11,375,852	$17,720,766
Miami-Fort Lauderdale-Miami Beach	$24,893,000	$44,233,212	$24,893,000	$44,233,212
Orlando-The Villages	$49,569,375	$88,719,067	$49,569,375	$88,719,067
Panama City-Lynn Haven	$22,593,439	$34,767,134	$22,511,413	$34,638,864
Pensacola-Ferry Pass-Brent	$14,131,409	$21,851,256	$14,131,409	$21,851,256
Sarasota-Bradenton-Venice	$12,446,500	$21,747,284	$12,446,500	$21,747,284
Tallahassee	$22,751,704	$33,435,196	$22,751,704	$33,435,196
Tampa-St. Petersburg-Clearwater	$0	$0	$0	$0
Florida	$204,088,290	$373,584,610	$204,147,564	$373,681,884
			2020	
	Direct	Total	Direct	Total
Gainesville	$82,367,463	$124,978,316	$82,426,738	$125,059,586
Jacksonville	$11,375,852	$17,720,766	$11,375,852	$17,720,766
Miami-Fort Lauderdale-Miami Beach	$24,893,000	$44,233,212	$24,893,000	$44,233,212
Orlando-The Villages	$77,311,443	$137,431,662	$77,311,443	$137,431,662
Panama City-Lynn Haven	$56,131,054	$85,182,011	$56,131,054	$85,182,011
Pensacola-Ferry Pass-Brent	$53,487,974	$84,494,590	$53,487,974	$84,494,590
Sarasota-Bradenton-Venice	$12,446,500	$21,747,284	$12,446,500	$21,747,284
Tallahassee	$22,751,704	$33,435,196	$22,751,704	$33,435,196
Tampa-St. Petersburg-Clearwater	$0	$0	$0	$0
Florida	$340,764,982	$624,061,332	$340,824,256	$624,158,606
			2025	
	Direct	Total	Direct	Total
Gainesville	$110,634,540	$168,133,202	$110,693,815	$168,214,472
Jacksonville	$11,375,852	$17,720,766	$11,375,852	$17,720,766
Miami-Fort Lauderdale-Miami Beach	$24,893,000	$44,233,212	$24,893,000	$44,233,212
Orlando-The Villages	$98,652,989	$174,905,508	$98,652,989	$174,905,508
Panama City-Lynn Haven	$82,215,862	$124,393,583	$82,215,862	$124,393,583
Pensacola-Ferry Pass-Brent	$84,098,624	$133,217,166	$84,098,624	$133,217,166
Sarasota-Bradenton-Venice	$12,446,500	$21,747,284	$12,446,500	$21,747,284
Tallahassee	$22,751,704	$33,435,196	$22,751,704	$33,435,196
Tampa-St. Petersburg-Clearwater	$0	$0	$0	$0
Florida	$447,069,068	$818,876,559	$447,128,342	$818,973,833

* The Florida numbers are greater than the sum of the BEA regions. This is due to interregional trade. All dollar value impacts are in $2009.

Table C.9. Employment from Agricultural Feedstock Production Under the Two Federal Policy Scenarios, 2015, 2020, and 2025*

BEA Region/State	The 25% RES		The 20% RES	
		2015		
	Direct	Total	Direct	Total
Gainesville	159	353	159	353
Jacksonville	40	88	40	88
Miami-Fort Lauderdale-Miami Beach	145	349	145	349
Orlando-The Villages	390	796	390	796
Panama City-Lynn Haven	84	189	84	188
Pensacola-Ferry Pass-Brent	55	128	55	128
Sarasota-Bradenton-Venice	167	271	167	271
Tallahassee	83	174	83	174
Tampa-St. Petersburg-Clearwater	0	0	0	0
Florida	1,283	2,887	1,283	2,888
		2020		
	Direct	Total	Direct	Total
Gainesville	302	692	302	692
Jacksonville	40	88	40	88
Miami-Fort Lauderdale-Miami Beach	145	349	145	349
Orlando-The Villages	518	1,109	518	1,109
Panama City-Lynn Haven	216	488	216	488
Pensacola-Ferry Pass-Brent	211	508	211	508
Sarasota-Bradenton-Venice	167	271	167	271
Tallahassee	83	174	83	174
Tampa-St. Petersburg-Clearwater	0	0	0	0
Florida	1,853	4,445	1,853	4,445
		2025		
	Direct	Total	Direct	Total
Gainesville	413	956	413	956
Jacksonville	40	88	40	88
Miami-Fort Lauderdale-Miami Beach	145	349	145	349
Orlando-The Villages	617	1,351	617	1,351
Panama City-Lynn Haven	318	721	318	721
Pensacola-Ferry Pass-Brent	332	803	332	803
Sarasota-Bradenton-Venice	167	271	167	271
Tallahassee	83	174	83	174
Tampa-St. Petersburg-Clearwater	0	0	0	0
Florida	2,296	5,656	2,296	5,657

* The Florida numbers are greater than the sum of the BEA regions. This is due to interregional trade. All dollar value impacts are in $2009.

Table C.10. Value-Added from Agricultural Feedstock Production Under the Two Federal Policy Scenarios, 2015, 2020, and 2025*

BEA Region/State	The 25% RES		The 20% RES	
		2015		
	Direct	Total	Direct	Total
Gainesville	$18,992,545	$30,274,868	$19,018,968	$30,313,020
Jacksonville	$3,198,386	$6,576,124	$3,198,386	$6,576,124
Miami-Fort Lauderdale-Miami Beach	$12,778,468	$24,847,556	$12,778,468	$24,847,556
Orlando-The Villages	$25,093,457	$47,062,170	$25,093,457	$47,062,170
Panama City-Lynn Haven	$11,218,024	$17,568,452	$11,196,245	$17,524,923
Pensacola-Ferry Pass-Brent	$10,037,008	$14,569,081	$10,037,008	$14,569,081
Sarasota-Bradenton-Venice	$6,389,132	$11,986,146	$6,389,132	$11,986,146
Tallahassee	$5,752,740	$11,118,128	$5,752,740	$11,118,128
Tampa-St. Petersburg-Clearwater	$0	$0	$0	$0
Florida	$93,572,643	$187,116,307	$93,599,067	$187,163,639
		2020		
	Direct	Total	Direct	Total
Gainesville	$50,761,261	$73,484,147	$50,787,684	$73,522,299
Jacksonville	$3,198,386	$6,576,124	$3,198,386	$6,576,124
Miami-Fort Lauderdale-Miami Beach	$12,778,468	$24,847,556	$12,778,468	$24,847,556
Orlando-The Villages	$48,418,934	$82,604,854	$48,418,934	$82,604,854
Panama City-Lynn Haven	$38,911,710	$55,449,369	$38,911,710	$55,449,369
Pensacola-Ferry Pass-Brent	$43,334,435	$61,843,459	$43,334,435	$61,843,459
Sarasota-Bradenton-Venice	$6,389,132	$11,986,146	$6,389,132	$11,986,146
Tallahassee	$5,752,740	$11,118,128	$5,752,740	$11,118,128
Tampa-St. Petersburg-Clearwater	$0	$0	$0	$0
Florida	$209,403,534	$370,226,820	$209,429,958	$370,274,152
		2025		
	Direct	Total	Direct	Total
Gainesville	$75,470,258	$107,091,355	$75,496,681	$107,129,507
Jacksonville	$3,198,386	$6,576,124	$3,198,386	$6,576,124
Miami-Fort Lauderdale-Miami Beach	$12,778,468	$24,847,556	$12,778,468	$24,847,556
Orlando-The Villages	$66,362,861	$109,947,287	$66,362,861	$109,947,287
Panama City-Lynn Haven	$60,451,240	$84,912,305	$60,451,240	$84,912,305
Pensacola-Ferry Pass-Brent	$69,232,432	$98,612,415	$69,232,432	$98,612,415
Sarasota-Bradenton-Venice	$6,389,132	$11,986,146	$6,389,132	$11,986,146
Tallahassee	$5,752,740	$11,118,128	$5,752,740	$11,118,128
Tampa-St. Petersburg-Clearwater	$0	$0	$0	$0
Florida	$299,494,235	$512,646,122	$299,520,659	$512,693,454

* The Florida numbers are greater than the sum of the BEA regions. This is due to interregional trade. All dollar value impacts are in $2009

APPENDIX D
FLORIDA ECONOMIC ACTIVITY FOR SELECTED RES SCENARIOS BY BEA

Table D.1. Economic Activity for Florida's Agricultural and State Economy, 2006

	Direct Economic Activity [a]						*Proportion of Agriculture to Total Economy*	*Number of Farms*[b]
State/BEA Region	Total State	Agricultural	Logging	Fishing	Hunting/ Trapping	Total Ag/For		
	Million 2006 $						Proportion	Number
Florida	$1,188,103.3	$7,932.7	$755.2	$221.2	$169.1	$9,078.3	0.008	47,463
Gainesville 62	$23,122.4	$620.9	$209.6	$28.0	$6.0	$864.5	0.037	6,705
Jacksonville 79	$100,159.0	$311.2	$102.4	$14.9	$14.1	$442.6	0.004	2,201
Miami-Fort Lauderdale-Miami Beach 106	$426,659.8	$2,954.7	$31.6	$52.4	$19.4	$3,058.1	0.007	7,000
Orlando-The Villages 121	$267,945.7	$1,818.1	$91.0	$21.7	$99.8	$2,030.6	0.008	14,696
Panama City-Lynn Haven 123	$13,560.7	$162.6	$78.7	$1.6	$12.0	$254.9	0.019	3,248
Pensacola-Ferry Pass-Brent 125	$39,717.4	$132.1	$17.7	$9.8	$0.0	$159.7	0.004	2,640
Sarasota-Bradenton-Venice 148	$105,085.8	$1,275.8	$96.0	$73.2	$2.3	$1,447.4	0.014	3,642
Tallahassee 163	$21,636.1	$194.7	$108.2	$9.0	$14.4	$326.2	0.015	2,376
Tampa-St. Petersburg-Clearwater 164	$190,463.0	$709.1	$20.0	$10.6	$1.3	$740.9	0.004	4,955

Sources: [a] Data developed from IMPLAN data bases; [b] 2007 Census of Agriculture

Table D.2. Projected Agricultural Economic Impacts as a Result of Selected Renewable Electricity Standards, Florida, by BEA Region, 2015, 2020, and 2025

	2015		2020		2025	
	25% RES	*20% RES*	*25% RES*	*20% RES*	*25% RES*	*20% RES*
Florida	$204,088,290	$204,147,564	$340,764,982	$340,824,256	$447,069,068	$447,128,342
Gainesville 62	$46,024,073	$46,083,348	$82,367,463	$82,426,738	$110,634,540	$110,693,815
Jacksonville 79	$11,375,852	$11,375,852	$11,375,852	$11,375,852	$11,375,852	$11,375,852
Miami-Fort Lauderdale-Miami Beach 106	$24,893,000	$24,893,000	$24,893,000	$24,893,000	$24,893,000	$24,893,000
Orlando-The Villages 121	$49,569,375	$49,569,375	$77,311,443	$77,311,443	$98,652,989	$98,652,989
Panama City-Lynn Haven 123	$22,593,439	$22,511,413	$56,131,054	$56,131,054	$82,215,862	$82,215,862
Pensacola-Ferry Pass-Brent 125	$14,131,409	$14,131,409	$53,487,974	$53,487,974	$84,098,624	$84,098,624
Sarasota-Bradenton-Venice 148	$12,446,500	$12,446,500	$12,446,500	$12,446,500	$12,446,500	$12,446,500
Tallahassee 163	$22,751,704	$22,751,704	$22,751,704	$22,751,704	$22,751,704	$22,751,704
Tampa-St. Petersburg-Clearwater 164	$0	$0	$0	$0	$0	$0

Table D.3. Estimated 2007 Gross Receipts Per Farm and Estimated Potential Per Farm Economic Impacts of Selected RES Scenarios for Florida by BEA, 2015, 2020, and 2025

State/BEA Region	2007 Agricultural Gross Receipts	2015		2020		2025	
		25% RES	*20% RES*	*25% RES*	*20% RES*	*25% RES*	*20% RES*
		Dollars/farm					
Florida	191,271	4,300	4,301	7,180	7,181	9,419	9,421
Gainesville 62	128,936	6,864	6,873	12,284	12,293	16,500	16,509
Jacksonville 79	201,088	5,168	5,168	5,168	5,168	5,168	5,168
Miami-Fort Lauderdale-Miami Beach 106	436,868	3,556	3,556	3,556	3,556	3,556	3,556
Orlando-The Villages 121	138,176	3,373	3,373	5,261	5,261	6,713	6,713
Panama City-Lynn Haven 123	78,465	6,956	6,931	17,282	17,282	25,313	25,313
Pensacola-Ferry Pass-Brent 125	60,480	5,353	5,353	20,261	20,261	31,856	31,856
Sarasota-Bradenton-Venice 148	397,410	3,417	3,417	3,417	3,417	3,417	3,417
Tallahassee 163	137,298	9,576	9,576	9,576	9,576	9,576	9,576
Tampa-St. Petersburg-Clearwater 164	149,529	0	0	0	0	0	0

APPENDIX E
Adjusted Bureau of Economic Analysis Regions Defined by County

Table E.1. Adjusted Bureau of Economic Analysis Region Assignment by County

County	Bureau of Economic Analysis Region
Alachua	Gainesville
Baker	Jacksonville
Bay	Panama City-Lynn Haven
Bradford	Gainesville
Brevard	Orlando-The Villages
Broward	Miami-Fort Lauderdale-Miami Beach
Calhoun	Panama City-Lynn Haven
Charlotte	Sarasota-Bradenton-Venice
Citrus	Orlando-The Villages
Clay	Jacksonville
Collier	Sarasota-Bradenton-Venice
Columbia	Gainesville
Miami-Dade	Miami-Fort Lauderdale-Miami Beach
De Soto	Sarasota-Bradenton-Venice
Dixie	Gainesville
Duval	Jacksonville
Escambia	Pensacola-Ferry Past-Brent
Flagler	Orlando-The Villages
Franklin	Tallahassee
Gadsden	Tallahassee
Gilchrist	Gainesville
Glades	Miami-Fort Lauderdale-Miami Beach
Gulf	Panama City-Lynn Haven
Hamilton	Gainesville
Hardee	Orlando-The Villages
Hendry	Miami-Fort Lauderdale-Miami Beach
Hernando	Tampa-St. Petersburg-Clearwater
Highlands	Orlando-The Villages
Hillsborough	Tampa-St. Petersburg-Clearwater
Holmes	Panama City-Lynn Haven
Indian River	Miami-Fort Lauderdale-Miami Beach
Jackson	Panama City-Lynn Haven
Jefferson	Tallahassee
Lafayette	Gainesville
Lake	Orlando-The Villages
Lee	Sarasota-Bradenton-Venice
Leon	Tallahassee
Levy	Gainesville
Liberty	Tallahassee
Madison	Tallahassee
Manatee	Sarasota-Bradenton-Venice

Table E.1. Adjusted Bureau of Economic Analysis Region Assignment by County

County	Bureau of Economic Analysis Region
Marion	Orlando-The Villages
Martin	Miami-Fort Lauderdale-Miami Beach
Monroe	Miami-Fort Lauderdale-Miami Beach
Nassau	Jacksonville
Okaloosa	Pensacola-Ferry Past-Brent
Okeechobee	Miami-Fort Lauderdale-Miami Beach
Orange	Orlando-The Villages
Osceola	Orlando-The Villages
Palm Beach	Miami-Fort Lauderdale-Miami Beach
Pasco	Tampa-St. Petersburg-Clearwater
Pinellas	Tampa-St. Petersburg-Clearwater
Polk	Orlando-The Villages
Putnam	Jacksonville
St. Johns	Jacksonville
St. Lucie	Miami-Fort Lauderdale-Miami Beach
Santa Rosa	Pensacola-Ferry Past-Brent
Sarasota	Sarasota-Bradenton-Venice
Seminole	Orlando-The Villages
Sumter	Orlando-The Villages
Suwannee	Gainesville
Taylor	Tallahassee
Union	Gainesville
Volusia	Orlando-The Villages
Wakulla	Tallahassee
Walton	Pensacola-Ferry Past-Brent
Washington	Panama City-Lynn Haven