Appendix X
Energy Supply and Demand (ESD)

August 12 - New information from CCS plus feedback from Action Team members are included throughout the document and are indicated with red text.

Summary List of Priority Policy Options for Analysis

Policy No.	Policy Option	GHG Reductions ($MMtCO_2e$)			Net Present Value 2009–2025 (Million $)	Cost-Effectiveness ($/t$CO_2e$)	Status of Option
		2017	2025	Total 2009-2025			
Tier 1							
ESD-3	Renewable Energy Incentives and Barrier Removal						Pending
ESD-5	Renewable Portfolio Standard (RPS)						Pending
ESD-6	Nuclear Power	0.0	11.2	69.2	$1,200	$17	Pending
ESD-7	Integrated Resource Planning (IRP) Some Action Team members felt that this option should be moved to Tier I	*Not to be quantified*					Pending
ESD-8	Combined Heat and Power (CHP) Systems						Pending
ESD-9	Power Plant Efficiency Improvements						Pending
ESD-11	Waste-To-Energy (WTE)						Pending
ESD-12	Demand-Side Management (DSM)/Energy Efficiency Programs, Funds, or Goals for Electricity	16.0	35.4	277.4	-$8,767	-$32	Pending
ESD-13a	Energy Efficiency in Existing Residential Buildings	5.8	8.7	91.6	$1,570	$17	Pending
ESD-14	Improved Building Codes for Energy Efficiency	0.0	7.3	14.5	$33	$2	Pending
ESD-15	Training and Education for Building Operators and Community Association Managers	*Not to be quantified*					Pending
ESD-17	Consumer Education Programs	*Not to be quantified*					Pending
ESD-23	Decoupling	*Not to be quantified*					Pending
Recent Actions							
	Building Codes for Energy Efficiency (HB 697 and Exec Order 127)	9.2	23.1	174.9	$162	$1	Pending

Policy No.	Policy Option	GHG Reductions ($MMtCO_2e$)			Net Present Value 2009–2025 (Million $)	Cost-Effective-ness ($/t$CO_2$e)	Status of Option
		2017	2025	Total 2009-2025			
Tier 2							
ESD-1	Technology Research and Development (R&D) with Commercial Opportunities						Pending
ESD-4	Electricity Transmission and Distribution Improvements						Pending
ESD-13b	Incentives for New Residential Buildings and Master Planned Communities Achieving High Energy Performance Standards						Pending
ESD-16	More Stringent Appliance/Equipment Efficiency Standards						Pending
ESD-18	Incentives to Promote Implementation of Customer-Sited Renewable Energy Systems						Pending
ESD-21	Rate Structures and Technologies to Promote Reduced Greenhouse Gas (GHG) Emissions						Pending
ESD-22	Demand-Side Management (DSM)/Energy Efficiency Programs, Funds, or Goals for Natural Gas						Pending

GHG = greenhouse gas; $MMtCO_2e$ = million metric tons of carbon dioxide equivalent; $/t$CO_2$e = dollars per metric ton of carbon dioxide equivalent.

Note: The numbering used to denote the above pending priority policy options is for reference purposes only; it does not reflect prioritization among these important draft policy options.

Action Team members requested that information on changes in energy consumption be reported, in addition to changes in GHG emissions.

Common Assumptions – August 7, 2008 (Information to be reviewed by TWG members)

This section provides the values currently used/suggested for analysis that apply across many options. Other assumptions are listed under the Quantitative analysis section of each option.

Estimate of Mitigation Option Costs and Benefits for State ESD GHG Analysis

Common Assumptions

Date Last Modified: *8/7/2008 A Bailie*

Common Assumptions		
Real Discount Rate	**5%**	
Levelized, Avoided Costs (2007-2025, 2006$)		
Electricity - Sales-Weighted Average	**$67**	$/MWh
Reflect energy credit of $60/MWh (natural gas combined cycle plant) and $7/MWh capacity credits based on calculations by Gulf, Preogress Energy, FPL, and TECO and submitted to Florida Public Service Commission as part of Petitions for Approval of a New Standard Offer for Purchase of Firm Capacity and Energy from Renewable Energy Facilities or Small Qualifying Facilities		
Electricity - Residential	**$67**	$/MWh
Electricity - Commercial	**$67**	$/MWh
Electricity - Industrial	**$67**	$/MWh
Levelized Costs not differentiated by sector for this analysis.		
Natural Gas	**$7.6**	$/MMBtu
Note: In the absence (as of 8/1/08) of specific avoided gas costs, we derive a placeholder estimate for avoided gas costs by starting with average 2007 citygate gas costs and escalating costs based on escalation in weighted-average regional AEO2008 estimates for gas cost by sector. These values should be replaced by state-specific costs when and if available.		
Prices		
Electricity Price - Sales-Weighted, Levelized	**$100**	$/MWh
Prices are based on DOE data for prices in 2007 http://www.eia.doe.gov/cneaf/electricity/esr/esr_sum.html. Changes from 2008 to 2025 are based on the relative changes in projected Florida ERC reliability Corporation region prices in US DOE Annual Energy Outlook 2008 (same % changes). AEO 2008 projects prices to declining to below 2005 levels from 2013 onward.		
Electricity - Residential Prices (Levelized, 2008-2025)	**$109**	$/MWh
Electricity - Commercial Prices (Levelized, 2008-2025)	**$93**	$/MWh
Electricity - Industrial Prices (Levelized, 2008-2025)	**$72**	$/MWh
Natural Gas (Delivered, RCI sales-weighted average)	**$12.8**	$/MMBtu
Natural gas prices are estimated as described for electricity above.		
Natural Gas - Residential Prices (Levelized, 2008-2025)	**$19.1**	$/MMBtu
Natural Gas - Commercial Prices (Levelized, 2008-2025)	**$12.5**	$/MMBtu
Natural Gas - IndustrialPrices (Levelized, 2008-2025)	**$10.3**	$/MMBtu
Biomass - All Users	**$3.1**	$/MMBtu
Estimate based on national study of state-by-state biomass resource resource assessments--see worksheet "Biomass_Data" in this workbook. Price equivalent of $47/dry ton at 16 MMBtu/dry ton. Replace with more State-specific estimates (for example, from AF group when available).		

Coal - Industrial Users	**$3.1**	$/MMBtu

average coal heat content of 26.75 MMBTU/ton, based on 2001 USDOE/EIA data. USDOE/EIA figures for 2006 from suggest average coal price of $84.16 per ton for coal for "Other Industrial Users" in Florida. www.eia.doe.gov/cneaf/coal/page/acr/table34.html

Oil - Distillate/Diesel	**$14.3**	$/MMBtu

USDOE/EIA data gives average annual spot prices for heating oil of $2.03 per gallon in the 2007 heating season. This cost does not include fuel taxes. An appendix to the 2006 Annual Energy Outlook by USDOE/EIA (see http://www.eia.doe.gov/oiaf/aeo/pdf/appendixes.pdf) lists an energy content for distillate oil of 5.799 MMBtu/bbl, or 0.138 MMBtu/gallon.

LPG	**$12.9**	$/MMBtu

USDOE/EIA data gives average annual spot prices for propane of $1.21 per gallon in 2007. This cost does not include fuel taxes. Prices expressed on $/MMBtu basis a conversion factor of 0.09133 MMBtu/gallon (see "Fuel Data" woksheet)

Landfill Gas - All Users	**$5.0**	$/MMBtu

Placeholder Estimate

Biogas Gas - All Users	**$5.0**	$/MMBtu

Placeholder Estimate

Emission Rates, etc.	**2015**	**2025**	**Units**
Electricity T&D losses (fraction of total generation)	**5.3%**	**5.1%**	
Avoided electricity emissions rate	**0.702**	**0.633**	tCO_2/MWh

Input used in Inventory and Forecast, dervied from Annual Energy Outlook (Sheet 6, row203) (Electricity T&D losses)

Assumes that reductions in electricity generation requirements through 2015 will come from the average emissions rate of then-existing fossil-fueled sources; by 2025 the predominant effect is assumed to be a reduction in reference case new fossil fuel plant builds during the 2015-2025 period.

placeholder, input needed from Inventory and Forecast

Costs for New Renewable Power Plants

This sub-section presents preliminary estimates for power plant cost data for Florida. Florida specific power plant data are available from the Florida Public Service Commission's (the Commission) website.[1] The data were submitted to the Commission by various stakeholders in response to the Commission's data request resulting from a renewable portfolio standard (RPS) workshop held on July 11, 2008. The purpose of the questionnaire was to provide the Commission with cost and technical potential information of renewable energy technologies within the state of Florida. Section 366.92(3)(a) of Florida Statutes directs the Commission to evaluate the current and forecasted installed capacity and levelized cost for each renewable energy generation method through 2020 as part of developing RPS requirements for the state. Both regulated electric utilities and interested parties were invited to provide information to the Commission. Completed questionnaires are available on the Commission website.[2]

Participants of the RPS workshop included representatives from:

[1] http://www.floridapsc.com/utilities/electricgas/RenewableEnergy/07_11_2008_index.aspx
[2] http://www.floridapsc.com/utilities/electricgas/RenewableEnergy/07_11_2008_index.aspx

- Decker Energy International
- Florida Public Utilities Company
- OUC
- Progress Energy Florida, Incorporated
- Florida Industrial Cogeneration Association
- Tamp Electric Company
- Wheelabrator Technologies
- BioMass Gas and Electric, LLC
- Lakeland Electric
- Regenesis Power, LLC
- Southern Alliance for Clean Energy
- Solid Waste Authority of Palm Beach County
- Florida Power and Light
- Gulf Power Company
- Professional Timber Harvesting Business Owners in Florida
- Covanta Energy
- Florida Solar Energy Center
- Seminole Electric Cooperative
- City of Clewiston
- City of Tampa
- Pinellas County Resource Recovery Facility
- Integrated Waste Services Association
- Florida Solar Coalition
- Florida Crystals

Participants were provided with a specific data entry form, available at the Commission's website.[3] The data submitted contain several types of data on both renewable energy and some conventional power plants including capital and O&M costs, levelized cost, capacity rating, capacity factor, and emission factors. Included renewable energy sources are solar, wind, biomass, hydro, biomass, landfill gas, municipal solid waste, ocean current, and chemical processing heat.

Table 1 summarizes median values and the range of capacity rating as well as capital costs of the response data.[4] Median and the range values were estimated because capacity rating and/or capital costs for some types of power plants are significantly different among data sources.[5]

Action Team noted that assumptions on future costs of power plants must be considered; costs of some types of plants could decline significantly.

[3] http://www.floridapsc.com/utilities/electricgas/RenewableEnergy/RPS_Data_Collection.pdf
[4] Other important information such as O&M costs, capacity factor, project life, and weighted average cost of capital will be presented in the next documentation.
[5] We did not include some data sources for this summary table when they present data in an inconsistent unit such as $/kW per year for capital costs or when the respondents did not provide specific data because such data are not available, unknown, or confidential (e.g., some biomass plants and municipal solid waste plants). We also excluded a few data sources on the ground that they appear as outliers, presenting extremely low or high values compared to others (e.g., $13,000 per kW in one case for offshore wind). Also note that specific cost of biodiesel plants were not provided, but instead were referred by the respondents to the cost for oil combustion turbines (Oil CT).

Table 1 Summary of the Capital Cost Data on Renewable Energy Power Plants Submitted to Florida Public Service Commission in its RPS Workshop (2006$)

Fuel	Energy source	Median capacity (MW)	Capacity range (MW)	Median capital cost (in 2006$/kW)	Capital cost range (in 2006$/kW)
Biomass					
	Biomass-direct combustion and plant matter	63	35-80	$2,519	$2,000-$3,040
	Biomass-animal waste	50	50	$4,199	$4,199
	Biomass-anaerobic digester	0.15	0.15	$4,152	$3,440-$4,860
	Biomass-gasification	43	35-50	$5,416	$2,960-$7,870
Landfill gas	Landfill gas	5	3-6	$1,576	$1,470-$1,950
Waste	Municipal solid waste	50	15-95	$6,311	$2,940-$7,874
Solar	Photovoltaic - small scale	0.006	0.005-0.25	$7,417	$6,490-$7,870
	Photovoltaic - over 1 MW	5	1-11	$5,201	$4640-$6490
	Solar water heating	0.002	0.0015-0.002	$1,854	$1,530-$2,780
	Solar thermal electric	75	2-100	$4,217	$1,520-$5,690
Chemical processing heat	Sulfuric acid waste heat	35	5-250	$2,846	$1,180-$3,330
Water	Hydro dam (incremental)	41	2-81	$1,131	$770-$1,740
	Run of river hydro	26	2-50	$2,035	$880-$3,190
	Hydro pumped storage	383	1-770	$1,462	$882-$2,040
Ocean current	Ocean thermal gradients	10	10	$12,455	$12,455
	Ocean tidal change	10	10	$2,573	$2,573
	Ocean wave action	5	0.75-10	$4,337	$3890-$4,790
Wind	Wind coastal	102	3.25-200	$2,640	$2560-$2,720
	Wind inland	39	3.25-75	$2,203	$1847-$2,559
	Wind offshore	102	4-200	$3,334	$2,720-$3,950

Note: all dollar values are converted to 2006$ using 2.5% inflation rate.

ESD-1. Technology Research & Development (R&D) With Commercial Opportunities

Policy Description

The State of Florida is committed to a leadership role in commercializing new energy technologies to reduce the state's carbon footprint and to reap benefits for the state's economy. Toward these ends, public and private funding will be mobilized and targeted to support research and development (R&D) of emerging energy technologies. This policy should be seen as enabling and supporting other energy supply and demand (ESD) policies and should target supply and demand side opportunities.

R&D funding can be targeted toward a particular technology or group of technologies as part of a state initiative to build an industry around that technology in the state, and to set the stage for use of the technology in the state. For example, an agency could be established to develop and deploy energy storage technologies.

R&D funding can be made available to any renewable energy or other advanced technology through an open bidding procedure (i.e., driven by bids received rather than by a focused strategy to develop a particular technology). Funding can also be given for demonstration projects to help commercialize technologies that have already been developed, but are not yet in widespread use. This funding will eventually lead to commercialization of reasonable cost generation technologies with low or zero greenhouse gas (GHG) emissions. Finally, funding can be targeted to increase collaboration among existing institutions in the state for R&D.

Policy Design

Goals: Achieve 15% emissions reductions from investments in clean and renewable technologies. Establish scenarios for near and long-term technologies and determine which technologies are eligible under each of these categories. Intended to be additive.

Timing: 5% reduction achieved by 2015, 10% by 2020, 15% by 2025.

Parties Involved: Universities, private sector, state agencies, and local governments.

Other: Technologies utilizing tidal, wave, wind and solar energy, and biofuels are eligible, among others to be identified.

As for longer-term technologies, those that require significant cost developments include carbon capture and storage (e.g., in deep saline aquifers or coal seams) for fossil fuel facilities, large-scale infrastructure for base-load renewable energy, and technologies that can transform intermittent renewables into base-load generation (e.g., batteries, hydrogen, compressed air storage).

Implementation Mechanisms

Given the magnitude of the task, an Apollo-like research program to create and field-test such technologies that are or have high potential to become commercially viable is needed. Presently, such funding is not a significant portion of a rate-regulated utilities budget or the budgets of federal and state government agencies. Nonetheless, even a small fee per kilowatt-hour (kWh) of electricity could generate significant funding. However, funding is only half the equation, and strategies to use such funds to implement a focused program to commercialize generation technologies with low or zero GHG emissions must also be developed.

- Establish an agency or program to support strategic development and deployment of new renewable energy technologies.
- Establish funding mechanisms for example a small fee per kWh of electricity.
- Identify mechanisms to encourage private capital investment.
- Establish parameters for eligible projects (e.g., 25% or 50% of project financing).
- Link with local government efforts (note existing relationships with biotechnology firms as an example).
- Evaluate and update funding and financing mechanisms at regular intervals.

Related Policies/Programs in Place

Since 2006, Florida has provided financial incentives through sales tax deductions, tax credits, and a robust grant program that has funded renewable technologies such as wind, solar, and bioenergy. Further building on this initiative, HB 7135 pushed R&D to a new level with the creation of Florida Energy Systems Consortium (FESC). This consortium is comprised of numerous Florida universities that research a variety of renewable technologies including, but not limited to, cellulosic ethanol, solar energy, and ocean current. This consortium received $50 million to advanced renewable technologies. In addition, Florida universities and state government enjoy many partnerships with private industries. The programs below total $84 million.

- Solar rebate program ($5 million),
- Sales tax deductions for hydrogen and biofuels ($3 million),
- Corporate investment tax credits for hydrogen and biofuels ($11 million),
- Renewable energy and efficiency grant program ($7 million),
- Farm-to-Fuel ($8 million), and
- FESC ($50 million).

Type(s) of GHG Reductions

To be determined (TBD)

Estimated GHG Reductions and Costs or Cost Savings

TBD

Data Sources:

Quantification Methods:

Key Assumptions:

Key Uncertainties

TBD

Additional Benefits and Costs

ESD-1 creates co-benefits in the areas of economic development and fuel diversity.

In the past year, over 4,000 megawatts (MW) of coal have been removed from Florida's fuel forecast and will likely be replaced largely by natural gas. Florida is already top heavy in terms of its use of natural gas to supply electricity. Florida's long-term strategy may require a large increase of nuclear generation. However, due to the lead time of permitting and construction, Florida can diversify its fuel portfolio more quickly through implementation of renewable generation.

The issue of job creation in clean energy industries is of great interest to states. Although numerical estimates vary, clean energy may create significantly more jobs than fossil energy per dollar invested. In a 2001 study, the Renewable Energy Policy Project (REPP) calculated that wind and solar energy produce 40% more jobs per dollar than coal. A 2004 study by the Renewable and Appropriate Energy Laboratory (RAEL) found that investment in renewable energy created three to five times as many jobs as the same investment in fossil-fuel energy systems. http://www.subnet.nga.org/downloads/energy/0807ENERGYRD.PDF

Feasibility Issues

TBD

Status of Group Approval

Pending

Level of Group Support

TBD

Barriers to Consensus

TBD

ESD-3. Renewable Energy Incentives and Barrier Removal

Policy Description

Renewable energy incentives and barrier removal can increase distributed and central grid-based resources of renewable energy throughout the state.

Institutional and market barriers to the development of renewable energy include price distortions, failure of the market to value the public benefits of renewables and the social cost of fossil fuel technologies, inadequate information, institutional barriers to grid interconnection, high transaction costs due to small project size, high financing costs because of lender unfamiliarity, and perceived risk. These can be overcome through a suite of financial and regulatory redresses, as well as through information and public education campaigns.

The legislature, the Florida Public Service Commission (PSC), and other relevant state agencies are encouraged to prioritize the identification and elimination of barriers impeding the development of renewable resources in the state.

Policy Design

Goals: Increase demand for distributed and central grid-based renewable energy in Florida by 1% to 2% per year (two separate scenarios), relative to a baseline to be determined. Establish a goal beyond the 20% renewable portfolio standard (RPS) goal set by Executive Order 7-127. The suggested goal by 2025 was 30%.

Timing: 2010 through 2025.

Parties Involved: Florida Energy and Climate Commission (FECC); PSC; all power producers operating qualifying renewable facilities in Florida; manufacturers; and local, state, and regional banks and other financial institutions.

Other: For purposes of this policy, according to the definition created by the Florida legislature in 366.91 in 2008, "renewable energy" means electrical energy produced from a method that uses one or more of the following fuels or energy sources: hydrogen produced from sources other than fossil fuels, biomass, solar energy, geothermal energy, wind energy, ocean energy, and hydroelectric power. The term includes the alternative energy resource, waste heat, from sulfuric acid manufacturing operations. http://www.flsenate.gov/Statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=Ch0366/SEC91.HTM&Title=->2007->Ch0366->Section%2091#0366.91.

Renewable energy sources should receive subsidies at least equal to nuclear to level the playing field, noting the current $9 per month per household fee for nuclear.

Implementation Mechanisms

Financial obstacles can be addressed through property tax exemptions, exclusions, and credits; or deductions to cover the expense of purchasing and installing renewable energy equipment; loan programs to aid in financing the purchase of renewable energy equipment; and grant programs designed for R&D or to help a project achieve commercialization.

Examples of financial incentives to encourage investment in renewable energy resources include:

- Direct subsidies for purchasing and selling renewable technologies;
- Tax credits or exemptions for purchasing renewable technologies;
- Feed-in tariffs, which provide direct payments to renewable generators for each kWh of electricity generated from a qualifying renewable facility; Action team member noted recent reports that show feed-in tariffs being lower cost than Renewable Portfolio Standards.
- Tax credits for each kWh generated from a qualifying renewable facility;
- Regulatory policies that provide incentives or assurance of cost recovery for utilities that invest in central station renewable-energy systems; and
- Incentives for solar/thermal water heating to offset the use of fossil fuels.

Regulatory policies can include solar or wind easements of access rights; development guidelines at the local level to enhance renewable energy generation (e.g., requiring proper street orientation); and requirements that utilities provide information and utility leasing programs for renewable energy production to customers in remote regions.

Pricing and metering strategies can provide price signals and revenue streams to support investment in and optimal operations of renewable energy systems. Net metering is a policy that allows owners of grid-connected distributed generation (DG) (generating units on the customer side of the meter, often limited to some maximum kW level) that produce excess electricity to sell it back to the grid, effectively "turning the meter backward." Net metering provides several incentives for renewable DG by reducing transaction costs (e.g., no need to negotiate contracts for the sale of electricity back to the utility) and increasing revenue by setting compensation at retail electricity rates, rather than at utility-avoided costs. In addition to net metering, pricing strategies of relevance to distributed renewable-energy systems can include "time-of-use" (TOU) rates. These are fixed rates for different times of the day or for different seasons that reflect the time-varying value of electricity.

Well-designed interconnection rules will ensure distributed power products meet minimum requirements for performance, safety, and maintenance, at the same time significantly advancing the commercialization of these technologies. Such rules, generally developed and administered by a state's Public Utilities Commission (PUC), establish clear and uniform processes and technical requirements for connecting DG systems to the electric utility grid.

Interconnection standards will reduce barriers to connection of DG systems to the grid. Connecting to the grid enables the facility to (a) purchase power from the grid to supply supplemental power as needed (for example, during periods of planned system maintenance), (b) sell excess power to the utility, and (c) maintain grid frequency and voltage stability, as well as utility worker safety.

Implementation mechanisms should involve manufacturers, producers, local, state, and regional banks and other financial institutions.

An Integrated Resources Planning (IRP) system should be used to maximize efficient and renewable energy generation. IRP (see option ESD-7) could support development and installation of these technologies, if they meet the stated objectives of the IRP process.

Related Policies/Programs in Place

Florida has taken a multifaceted approach to reducing barriers to renewable generation and bringing those technologies to market. For example, the PSC has approved standard offer contracts to reduce regulatory lag and negotiations between qualifying renewable facilities and utilities. Also, the PSC recently approved tariffs to implement one of the nation's most aggressive net-metering laws by expediting interconnection and allowing up to 2 MW for inclusion of offset at the retail rate for 12 consecutive months. Moreover, Florida has a host of state-sponsored financial incentive programs to bring these technologies to market. These programs include the highly successful solar rebate program ($5 million), sales tax deductions for hydrogen and biofuels ($3 million), corporate investment tax credits for hydrogen and biofuels ($11 million), renewable energy and efficiency grant program ($7 million); Farm-to-Fuel ($8 million); and FESC ($50 million).

It is important to note that the passage of HB 7135 requires the PSC to view DG under 2 MW as energy efficient. In addition, a housing appraiser cannot financially penalize a Floridian for adding a renewable energy device to his or her home.

The Energy Policy Act of 2005 (EPAct) directs states to consider upgrading their standards for interconnecting small generators within one year of enactment (http://www.epa.gov/chp/pdf/interconnection_factsheet.pdf).

Type(s) of GHG Reductions

TBD

Estimated GHG Reductions and Costs or Cost Savings

TBD

Data Sources:

- Renewables definition – Florida legislature, 366.91 in 2008
- Renewable resource potential – TBD

- Renewable plant costs – see Common Assumptions above and ESD-5
- Avoided cost and emissions for electricity – see Common Assumptions

Quantification Methods:

Key Assumptions:

Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

Pending

Level of Group Support

TBD

Barriers to Consensus

TBD

ESD-4. Electricity Transmission and Distribution Improvements

Policy Description

Measures to improve transmission systems to reduce bottlenecks and enhance throughput may be required to satisfy long-term electricity demands and improve the energy efficiency of operations system-wide. Opportunities may exist to substantially increase transmission-line carrying capacity through the implementation of new construction and retrofit activities on the transmission grid, including incorporating advanced composite-conductor technologies, capacitance technologies, and grid management software.

To increase efficiency, new generation must be closer to load. Siting new transmission lines can be a difficult process given their cost and their local impact on the environment, and on the use, enjoyment, and value of property. Policy measures in support of this option could provide incentives to utilities to upgrade transmission systems and reduce barriers to siting of new transmission lines. It should also consider the incorporation of demand response systems and smart grid technologies.

Policy Design

Goals: Reduce system-wide losses from transmission, generation, and distribution by an average of 5% of total energy delivered across Florida by 2018.

Timing: Phase in beginning in 2011, with the goal achieved by 2018.

Parties Involved: FECC, Florida Department of Environmental Protection (DEP), Florida Public Regulatory Commission (PRC), and possibly Florida Reliability Coordinating Council (FRCC).

Other: Coverage of renewable energy sources (TBD).

Implementation Mechanisms

There are several energy efficiency measures that can be implemented to reduce the transmission and distribution line losses of electricity. Utilities use a variety of components throughout the transmission and distribution system to manage losses. Increasing the efficiency of these components can further reduce losses and associated GHG emissions. For example, the State of Vermont offers a rebate to encourage the installation of energy-efficient transformers. Regulations, incentives, and support programs can be applied to achieve greater efficiency of transmission and distribution system components.

- Create incentive program to encourage capital investments.
- An IRP system should be used to maximize efficient and renewable energy generation. IRP (see option ESD-7) could support development and installation of these technologies, if they meet the stated objectives of the IRP process.

Related Policies/Programs in Place

The PSC places emphasis on reducing the growth rates of weather-sensitive peak demand, reducing and controlling the growth rates of electricity consumption, and reducing the consumption of scarce resources such as petroleum fuels. The PSC has adopted rules requiring those electric utilities that are subject to Florida Energy Efficiency and Conservation Act (FEECA) to implement demand-side management (DSM) programs that are cost-effective. Section 366.82(4), Florida Statutes, directs the commission to provide an annual report to the legislature and the Governor with the DSM goals it has adopted under FEECA and the progress toward meeting these goals.

HB 7135 (2008) made major revisions to FEECA. Utilities subject to the PSC's rate-making jurisdiction may receive incentives for additional efficiencies to generating facilities, transmission, and DSM programs. For example, an investor-owned utility may receive up to 50 basis points return on its investment if that utility offsets 20% or more of its new load growth through efficiencies. These efficiencies apply to the supply side and the demand side of the equation. Further, the new legislation streamlines the siting of transmission associated with nuclear generation by allowing access to Florida Department of Transportation (FDOT) right-of-ways and state lands. In addition, utilities can receive advanced cost recovery for transmission lines directly associated with a nuclear facility or relocation of transmission as a result of a new nuclear facility.

Type(s) of GHG Reductions

TBD

Estimated GHG Reductions and Costs or Cost Savings

TBD

Data Sources:

Quantification Methods:

Key Assumptions:

Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

Pending

Level of Group Support

TBD

Barriers to Consensus

TBD

ESD-5. Renewable Portfolio Standard (RPS)

Policy Description

RPS is a requirement that utilities must supply a certain, generally fixed percentage of electricity from an eligible renewable energy source(s). The fundamental policy object is to reduce GHG emissions, provide fuel diversity, and stimulate Florida's economy.

In some states, and in Florida, utilities can also meet their RPS, or environmental portfolio standard (EPS), by purchasing certificates from eligible energy projects, typically referred to as Renewable Energy Certificates (RECs). The percentage should be based on capacity.

Policy Design

Goals: 20% by 2020 or 2025, pending analysis.

Timing: Ramp up beginning in 2012 until the final level is reached in 2020 or 2025.

Parties Involved: FECC, PSC, DEP, investor-owned utilities, public power, electric cooperatives, and state government.

Other: For the purposes of this policy, according to 366.91 created by the Florida legislature in 2008 as follows: "Renewable energy" is defined as electrical energy produced from a method that uses one or more of the following fuels or energy sources: hydrogen produced from sources other than fossil fuels, biomass, solar energy, geothermal energy, wind energy, ocean energy, and hydroelectric power. The term includes the alternative energy resource, waste heat, from sulfuric acid manufacturing operations. http://www.flsenate.gov/Statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=Ch0366/SEC91.HTM&Title=->2007->Ch0366->Section%2091#0366.91.

Implementation Mechanisms

Action Team member asked that Feed-in tariffs be included as a possible implementation mechanism.

Related Policies/Programs in Place

The PSC is currently engaged in rulemaking that would allow for a utility to meet the RPS either directly through the production of renewable energy or through the trading of renewable energy credits. The percentage must be based on retail sales, and HB 7135 also allows for added weight to those credits for solar and wind. This rule must be presented to the 2009 legislature for its consideration and ultimate ratification. The Florida PSC and the FECC are working with the Florida Energy Office (FEO) to catalog all available renewable resources in the state.

366.91 section b: defines "renewable energy" means electrical energy produced from a method that uses one or more of the following fuels or energy sources: hydrogen produced from sources other than fossil fuels, biomass, solar energy, geothermal energy, wind energy, ocean energy, and hydroelectric power. The term includes the alternative energy resource, waste heat, from sulfuric acid manufacturing operations. http://www.flsenate.gov/Statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=Ch0366/SEC91.HTM&Title=->2007->Ch0366->Section%2091#0366.91.

Type(s) of GHG Reductions

TBD

Estimated GHG Reductions and Costs or Cost Savings

TBD

Data Sources:

- Renewables definition – Florida legislature, 366.91 in 2008
- Renewable resource potential
  - Navigant Consulting Inc. (October 2007), *Renewable Systems Interconnection: Rooftop PV Market Penetration Scenarios* (draft), available at http://www1.eere.energy.gov/solar/solar_america/pdfs/14_rsi_rooftop_pv_market_penetration_draft_103007.pdf
  - FPL (January 2007), "Renewable Energy Potential in Florida", available at www.psc.state.fl.us/utilities/electricgas/RenewableEnergy/Hartman-FPL.ppt
  - Florida Public Service Commission (March 2008), *PSC Staff Summary of the Information Gained from Public Service Commission Workshops on a Renewable Portfolio Standard*, available at http://www.psc.state.fl.us/utilities/electricgas/RenewableEnergy/2008_03RPSSummaryFinal.pdf
- Renewable plant costs (2010 – 2025)
  - State of Florida Public Service Commission (FL PSC)'s renewable energy database.[6]
    - Decker Energy. RPS Data Forms 1 to 6.
    - Florida Phosphate Fertilizer Manufacturers CF Industries, Mosaic, and PCS. RPS Data Forms 1 to 6.
    - Florida Solar Coalition. RPS Data Forms 1 to 6.
    - Florida Crystals. RPS Data Forms 1 to 6.
    - Gulf Power Company. RPS Data Forms 1 to 6.
    - Hillsborough County Resource Recovery Facility - Existing - Covanta Hillsborough. RPS Data Forms 1 to 6.
    - OUC. RPS Data Forms 1 to 6.
    - Progress Energy Florida, Inc. RPS Data Forms 1 to 6. July 21, 2008.
    - Pinellas County Resource Recovery Facility. RPS Data Forms 1 to 6.

[6] http://www.floridapsc.com/utilities/electricgas/RenewableEnergy/07_11_2008_index.aspx

    - Regenesis Power LLC. RPS Data Forms 1 to 6.
    - Solid Waste Authority of Palm Beach County. RPS Data Forms 1 to 6.
    - Florida Power & Light Company. RPS Data Forms 1 to 6.
    - Tampa Electric Company. RPS Data Forms 1 to 6.
    - Wheelabrator South Broward Inc. RPS Data Forms 1 to 6.
  - National Renewable Energy Laboratory, National Wind Technology Center (November 19, 2007), "Wind Integration Impacts: Results of Detailed Simulation Studies and Operational Practice in the U.S.," (presents data on wind integration costs). Available at: http://www.neo.ne.gov/renew/wind-working-group/milligan_wind-integration-nppd.ppt.
  - Ryan Wiser and Mark Bolinger (May 2007), *Annual Report on U.S. Windpower Installation, Cost, and Performance Trends: 2006*, U.S. DOE, Lawrence Berkeley National Laboratory. Available at: http://www.nrel.gov/docs/fy07osti/41435.pdf.
  - Ryan Wiser, Mark Bolinger, Peter Cappers, and Robert Margolis (January 2006), *Letting the Sun Shine on Solar Costs: An Empirical Investigation of Photovoltaic Cost Trends in California*, LBNL-59282, U.S. DOE, Lawrence Berkeley National Laboratory. Available at: http://eetd.lbl.gov/ea/EMP/reports/59282.pdf.

Quantification Methods:

Key Assumptions: TBD

Key Uncertainties

TBD. Dynamic nature of rapidly shifting marketplace and costs are significant uncertainty factors.

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

Pending

Level of Group Support

TBD

Barriers to Consensus

TBD

ESD-6. Nuclear Power

Policy Description

Nuclear power has historically presented a low-GHG source of electricity. However, no new commercial reactor has come on line in the United States since 1996 due to extremely high capital costs, the absence of any plan or technology for permanent disposal of nuclear waste, and risks to public safety exemplified by high-profile accidents at Three Mile Island and Chernobyl. The current Administration has been supportive of nuclear expansion, emphasizing its importance in maintaining a diverse energy supply and its reputation for producing electricity with negligible pollutant emissions during operation. Congress has also offered significant financial subsidies for new nuclear plants in an effort to jump-start the industry, including limitations on liability for nuclear accidents.

Today, nuclear power plants provide about 20% of electric power nationally. The role of existing and new units needs to be considered for a comprehensive climate-change policy process.

Policy Design

Goal: Four new 1,100 MW nuclear plants operating at 92% capacity factor (including two approved for Florida Power & Light Company [FPL] and two others approved). Two 1,100 MW plants/units are assumed to be part of the baseline (Scenario 1). Add two additional 1,100 MW plants to the baseline (Scenario 2).

The quantitative analysis below assumes that two additional (relative to the reference case) plants/units of 1,100 MW each are added in 2020. Ensure that 2,200 MW of new nuclear capacity are included in the reference case?

Timing: New plants operational in 2020.

Parties Involved: U.S. Nuclear Regulatory Commission (NRC), PSC, Progress Energy Florida (PEF), and FPL. Also, possibly Gulf Power and the Jacksonville Electric Authority (JEA).

Other: TBD

Implementation Mechanisms

IRP (see option ESD-7) could support development and installation of these technologies, if they meet the stated objectives of the IRP process.

Related Policies/Programs in Place

With the construction of a traditional electric generator, the utility must assume all the costs of permitting, planning, and construction until the plant is operational, and only once it is producing electricity may the utility begin collecting cost recovery revenues. The design, permitting, planning, and construction of a nuclear facility may take from 8 to 10 years to complete. The long planning and permitting process for nuclear facility means that a utility would have to assume all costs to develop the project for a decade before it could begin recovering those expenses. In recognition of that burden and to stimulate the development of new nuclear facilities in Florida, during the 2007 session, the legislature passed, and Governor Crist signed, legislation allowing utilities to begin recovering the expenses associated with nuclear facilities in advance. During the 2008 legislative session, HB 7135 added the recovery of expenses associated with new, expanded, or relocated electrical-transmission lines needed for the operation of a nuclear power plant. A provision was added to allow an electric utility to obtain a separate permit to begin construction of facilities (such as access roads, rail lines, or electric transmission facilities) on a site in support of a future nuclear generator before the nuclear certification is issued.

The current administration has been supportive of nuclear expansion. Congress has also offered significant financial subsidies for new nuclear plants in an effort to jump-start the industry, including limitations on liability for nuclear accidents. The U.S. Department of Energy (US DOE) recently announced submittal of a license application (LA) to the NRC seeking authorization to construct America's first repository for spent nuclear fuel and high-level radioactive waste at Yucca Mountain, Nevada. Currently, the waste is stored at 121 temporary locations in 39 states across the nation.

In Florida, a total of 5,600 MW of nuclear generation is planned through 2020.

Table X-1. Florida MW of planned nuclear through 2020

Utility	FPL	FPL	FPL	PEF	PEF	JEA
Location	Miami-Dade	St. Lucie	Miami-Dade	Levy County	Citrus County	Georgia
Name	Turkey Pt. 6 & 7	St. Lucie 1 & 2	Turkey Pt. 3 & 4	Levy Units 1 & 2	Crystal River Unit 3	
Capacity (MW)	1,100–1,520 each	103 each Upgrade (?)	104 each Upgrade (?)	1,100 each	37 and 129 Upgrade (?)	200
In Service	6/2018 and 6/2020	Fall 2011 and Spring 2012	Spring 2012 and Fall 2012	6/2016 and 6/2017	12/2009 (37) and 12/2011 (129)	2016

FPL = Florida Power & Light Company; PEF =Progress Energy Florida; JEA = Jacksonville Electric Authority.

Type(s) of GHG Reductions

TBD

Estimated GHG Reductions and Costs or Cost Savings

PRELIMINARY ESTIMATES

ESD – 6 Nuclear	2017	2025	Units
GHG Emission Savings	**0.0**	**11.2**	$MMtCO_2e$
Net Present Value (2009-2025)		**$1,200**	$million
Cumulative Emissions Reductions (2009-2025)		69.21	$MMtCO_2e$
Cost-Effectiveness		**$17.33**	$\$/tCO_2e$

Data Sources:

- Nuclear plant costs (2010 – 2025)
    - Florida Power & Light Company. RPS Data Forms 1 to 6. http://www.floridapsc.com/utilities/electricgas/RenewableEnergy/07_11_08_Staff_to_FPL.pdf
    - Moody's Investors Service, October 2007. "New Nuclear Generation in the United States: Keeping Options Open vs. Addressing An Inevitable Necessity."
    - Catherine Morris et al. (June 2007), *Nuclear Power Joint Fact-Finding*, The Keystone Center. Available at: http://www.keystone.org/spp/documents/FinalReport_NJFF6_12_2007(1).pdf

Quantification Methods:

Generation from nuclear plants calculated based on capacity and capacity factor, from option goals. The generation is assumed to be start in 2000 and continue at same level through 2025.

Key Assumptions:

Costs of Nuclear Plant (PRELIMINARY)

	LCOE (2005$/MWh)	Average Capacity factor	Installed Cost (2005$/kW)	Fixed O&M (2005$/ kW/yr)	Variable O&M (2005$/ MWh)	Fuel Cost (2005$/ MWh)	Eco-nomic Life (years)	CRF
Nuclear Power	$88	92%	$5,700	$73.3	$18.0	$3.6	40	8.1%

Notes: LCOE – levelized cost of electricity

CRF – Capital recovery factor

Sources: Keystone for fixed O&M, fuel; average of Moody's and Progress Energy nuclear plant proposal

Avoided costs of electricity: $67 / MWh, see Common Assumptions

Avoided GHG emissions for electricity: 0.69 MtCO2e/MWh in 2017, 0.63 MtCO2e/MWh in 2025 (preliminary), see Common Assumptions

Key Uncertainties

The construction of nuclear plants is directly tied to the price of oil, and there is significant uncertainty in future oil prices. Also no new commercial reactor has come on line in the United States since 1996 due to high capital costs, the certainty of Yucca Mountain, and risks to public safety exemplified by high-profile accidents at Three Mile Island and Chernobyl.

Additional Benefits and Costs

There are significant potential risks associated nuclear power, including unresolved waste disposal issues, negative impacts on human health, cost overruns, and siting and permitting issues that need consideration.

Feasibility Issues

TBD

Status of Group Approval

Pending

Level of Group Support

TBD

Barriers to Consensus

TBD

ESD-7. Integrated Resource Planning (IRP)

Policy Description

IRP is a planning process that strives to meet needs for electricity services in a manner that meets multiple objectives, such as least cost, meeting emissions standards, fuel diversity, and RPS requirements. An IRP process should include evaluation of all options, from the supply and demand sides, in a fair and consistent manner, building in flexibility to account for future uncertainties. While originally targeted primarily towards cost minimization, IRP processes have increasingly considered the environmental risks and the potential costs associated with future regulation of GHGs.

TWG members have been asked to supply additional text to further define this option.

Action team members felt this option should be moved to Tier I and consideration be made for quantification of reductions and costs.

Policy Design

Goals: Nonquantifiable. To develop a comprehensive state resource adequacy plan for Florida that meets the energy reliability, environmental, and economic needs of the state.

Timing: Final plan is to be completed by June 30, 2010.

Parties Involved: FECC, DEP, regulated electric utilities, environmental and consumer advocates, renewable energy industry, energy efficiency industry, and the financial community.

Other: TBD

Implementation Mechanisms

TBD

Related Policies/Programs in Place

Florida has a reliable and robust IRP in place. All investor-owned utilities, as well as, Orlando Utilities Commission (OUC) and JEA file Ten-Year Site Plans (TYSP) with the PSC. The TYSP is an annual filing that provides a list of future generation for the next 10 years, and the PSC acknowledges the TYSP. In addition, the PSC determines the need for generation (75 MW of steam or solar) in a determination that is triggered by a utility's TYSP filing. The PSC takes into account availability of efficient and renewable generation prior to approving the necessity of a power plant. Lastly, the power plant must go through the Power Plant Siting Act (PPSA), a rigorous multiagency review that requires obtaining all environmental criteria and ultimate approval by the Governor and his siting board.

Type(s) of GHG Reductions

TBD

Estimated GHG Reductions and Costs or Cost Savings

TBD

Data Sources:

Quantification Methods:

Key Assumptions:

Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

Pending

Level of Group Support

TBD

Barriers to Consensus

TBD

ESD-8. Combined Heat and Power (CHP) Systems

Policy Description

Combined heat and power (CHP) is generally considered to refer to the use of a heat engine or a power station to simultaneously generate electricity and useful heat. Conventional power plants emit the heat created as a by-product of electricity generation into the environment through cooling towers, flue gas, or by other means. CHP systems reduce fossil fuel use and GHG emissions through the improved efficiency of the CHP systems, relative to separate heat and power technologies, and by avoiding transmission and distribution losses associated with moving power from central power stations located far away from where the electricity is used.

Here CHP is defined broadly to include large-scale projects for heat and waste heat recovery, and is intended to capture all sources of by-product heat generation, including waste heat from exothermic reactions when sulfuric acid is produced such as is generated in phosphate fertilizer manufacturing.

This policy should also address the numerous barriers to CHP processes, including inadequate information, institutional barriers, high transaction costs due to small project size, lender unfamiliarity and perceived risk, "split incentives" between building owners and tenants, and utility-related policies (such as interconnection requirements, high standby rates, and exit fees).

Policy Design

Goals: Ramp up CHP to 5 million megawatt-hours (MWh) of total generation by 2022 (insert rationale for goal). Set up for sensitivity analysis.

Timing: Beginning in 2012, ramp up new CHP linearly, until 5 million MWh is reached in 2022.

Parties Involved: State government and regulators, PSC, including the FECC, electric utilities, and renewable energy and CHP industry.

Other: Coverage should be defined broadly to include waste heat from all sources of by-product heat generation, including waste heat from exothermic reactions when sulfuric acid is produced such as is generated in phosphate fertilizer manufacturing. Coverage will include biomass and natural gas.

Implementation Mechanisms

Potential elements of this option include

- Promotion of the use of gas-fired CHP systems,
- Promotion of the use of biomass-fired CHP systems, and

- Creation and expansion of markets for and incentives designed to promote implementation of CHP units in capacities suitable for residential, commercial, and industrial users.

Specific financial incentives for CHP could include

- Direct subsidies for purchasing and selling CHP systems given to the buyer or seller;
- Tax credits or exemptions for purchasing and selling CHP systems given to the buyer or seller;
- Tax credits or exemptions for operating CHP systems;
- Feed-in tariffs, which are direct payments to CHP owners for each kWh of electricity or British thermal unit (Btu) of heat generated from a qualifying CHP system;
- Tax credits for each kWh or Btu generated from a qualifying CHP system; and
- Targeted financing arrangements.

Other supporting measures for this option include training and certification of installers and contractors, net metering and other pricing arrangements, establishment of clear and consistent interconnection standards, and creation and support of markets for biomass fuels.

Pricing and metering strategies can provide price signals and revenue streams to support investment in and optimal operations of CHP systems. Net metering is a policy that allows owners of grid-connected DG (generating units on the customer side of the meter, often limited to some maximum kW level) that generates excess electricity to sell it back to the grid, effectively "turning the meter backward." Net metering provides several incentives for renewable DG by reducing transaction costs (e.g., no need to negotiate contracts for the sale of electricity back to the utility) and increasing revenue by setting compensation at retail electricity rates rather than at utility-avoided costs. In addition to net metering, pricing strategies of relevance to CHP and distributed renewable-energy systems can include TOU rates. These are fixed rates for different times of the day or for different seasons that reflect the time-varying value of electricity.

Policies to remove barriers can include: improved interconnection policies; improved policies for rates and fees; streamlined permitting; recognition of the emissions reduction value provided by CHP, clean DG financing packages, and bonding programs; power procurement policies; ability to provide power to third party power; and education and outreach.

An IRP system should be used to maximize efficient and renewable energy generation. IRP (see option ESD-7) could support development and installation of these technologies, if they meet the stated objectives of the IRP process.

Related Policies/Programs in Place

TBD

Type(s) of GHG Reductions

TBD

Estimated GHG Reductions and Costs or Cost Savings

TBD

Data Sources:

- Costs and potential of CHP systems
  - ACEEE June 2007. *Potential for Energy Efficiency and Renewable Energy to meet Florida's Growing Energy Demands*
  - US EPA, recent analysis to be posted in early August, contact Katrina Pielli
  - GRI and NREL 2003—Gas Research Institute and U.S. DOE National Renewable Energy Laboratory (2003), Gas-Fired Distributed Energy Resource Technology Characterizations: Bringing You a Prosperous Future Where Energy Is Clean, Abundant, Reliable, and Affordable. Available at: www.eea-inc.com/dgchp_reports/TechCharNREL.pdf.

Quantification Methods:

Key Assumptions:

Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

Pending

Level of Group Support

TBD

Barriers to Consensus

TBD

ESD-9. Power Plant Efficiency Improvements

Policy Description

Efficiency improvements refer to increasing generation efficiency at power stations through incremental improvements at existing plants (e.g., more efficient boilers and turbines, improved control systems, or combined cycle technology). Repowering existing plants refers to switching to lower or zero emitting fuels at existing plants or for new capacity additions. This includes use of biomass or natural gas in place of coal or oil. Policies to encourage efficiency improvements and repowering of existing plants could include incentives or regulations as described in other options, with adjustments for financing opportunities and emissions rates of existing plants.

Policy Design

Goals: To improve the heat rates of all existing power plants of the statewide fleet improved by an average of 10% through efficiency improvements/fuel switching or repowering. The cost of HB 7135 is to be included in baseline.

Timing: Improvements begin in 2012, ramping up to a 10% improvement by 2020.

Parties Involved: All power plants in the state.

Other: TBD

Implementation Mechanisms

An IRP system should be used to maximize efficient and renewable energy generation. IRP (see option ESD-7) could support development and installation of these technologies, if they meet the stated objectives of the IRP process.

Related Policies/Programs in Place

HB 7135 made major revisions to FEECA. Utilities subject to the PSC's rate-making jurisdiction may receive incentives for additional efficiencies. For example, an investor-owned utility may receive up to 50 basis points extra return on its investment, so long as that utility offsets 20% or more of its new load growth through efficiencies to its generating facilities.

Type(s) of GHG Reductions

TBD

Estimated GHG Reductions and Costs or Cost Savings

TBD

Data Sources:

- Utility reports to Florida Public Service Commission

TWG Members asked to provide links to reports on energy efficiency improvements at existing plants.

Quantification Methods:

Key Assumptions:

Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

Pending

Level of Group Support

TBD

Barriers to Consensus

TBD

ESD-11. Waste-to-Energy (WTE)

Policy Description

This policy option focuses on capture of methane (CH_4) gas from landfills, and converting waste-to-energy (WTE) to reduce direct emissions and to produce electricity. An added policy benefit of converting WTE is obviating the need for landfills and produce base-load like electric generation. Certain components of municipal waste can be used as a nonfossil combustion resource for generating electricity. This option could be structured as either a mandate or an incentive program.

Policy Design

Goals: 90% of qualifying landfills in Florida that do not already capture landfill gas and convert it to energy (or sell the gas to a utility for conversion to energy) are doing so by 2025.

Timing: First landfill converted by 2012; by 2025, 90% of all qualifying landfills in the state will be capturing their CH_4 emissions and using or selling the gas for energy.

Parties Involved: Municipal and county governments, private solid waste management companies, local economic development agencies, FECC, state regulatory agencies, PUC, nongovernment organizations, and public interest groups.

Other: Coverage should extend beyond utilities. Other categories are TBD.

Implementation Mechanisms

An IRP system should be used to maximize efficient and renewable energy generation. IRP (see option ESD-7) could support development and installation of these technologies, if they meet the stated objectives of the IRP process.

Related Policies/Programs in Place

Florida defines these technologies as renewable, and has a production tax credit of $0.01 kWh currently in place. The program is capped at a total of $5 million. In 2007, Florida did not reach the cap.

Type(s) of GHG Reductions

TBD

Estimated GHG Reductions and Costs or Cost Savings

TBD

Data Sources:

- Costs and potential of landfill gas systems
    - EPA Landfill Methane Outreach Program. http://www.epa.gov/lmop/proj/index.htm

Quantification Methods:

Key Assumptions:

Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

Pending

Level of Group Support

TBD

Barriers to Consensus

TBD

ESD-12. Demand-Side Management (DSM)/Energy Efficiency Programs, Funds, or Goals for Electricity

Policy Description

DSM entails actions that influence the quantity or patterns of use of energy consumed by end users. This option focuses on increasing investment in electricity DSM through programs run by utilities or others, energy efficiency funds, and energy efficiency goals. These options may be designed to work in tandem with other strategies that encourage efficiency gains.

Policy Design

The policy design includes two key and linked dimensions: achievable/desirable energy savings and policy/administrative mechanisms to achieve these savings.

Goals: In each sector—residential, commercial and industrial—reduce electricity consumption relative to consumption in the prior year by 1.0% per year through 2012, then by 1.5% per year through 2015, and then 2.0% per year thereafter through 2030.

Timing: 2010 is the first year of compliance.

Parties Involved: All electric utilities (public and private), regulators, municipal utilities and cooperatives and customers (all sectors).

Other: TBD

Implementation Mechanisms

Policy and administrative mechanisms that might be applied include regulator-verified savings targets, public benefit charges, portfolio standards, "energy trusts," IRP, performance-based incentives, decoupling of rates and revenues, and appropriate rate treatment for efficiency. Potential mechanisms include revising existing statutes to enable utility investments in energy efficiency at the levels indicated above, to consider as potentially eligible programs that are cost-effective taking into account the valuation of carbon dioxide (CO_2) emissions.

Elements that might be considered in designing this option include

- Implementation and administration by utility (including municipal utilities and cooperatives), state agency, or third-party actors;
- Subsidized energy audits for homeowners, businesses, industries;
- Incentives for specific technologies, potentially including, but not limited to, lighting, water heating, plug loads, networked personal-computer management, power supplies, motors, pumps, boilers, customer-side transformers, water-use reduction, ground-source heat pumps, and others; and

- Energy efficiency reinvestment funds.

This policy may be broad in focus, or it can focus on specific market segments. Complementary policies include appliance recycling/pickup programs. Measures supporting this option might include consumer education, performance contracting, and energy end-use surveys.

An IRP system should be used to maximize efficient and renewable energy generation. IRP (see option ESD-7) could support development and installation of these technologies and initiatives, if they meet the stated objectives of the IRP process.

Related Policies/Programs in Place

FEECA places emphasis on reducing the growth rates of weather-sensitive peak demand, reducing and controlling the growth rates of electricity consumption, and reducing the consumption of scarce resources such as petroleum fuels. The PSC has adopted rules requiring those electric utilities that are subject to FEECA to implement cost-effective DSM programs.

Section 366.82(4), Florida Statutes, directs the commission to provide an annual report to the legislature and the Governor with the DSM goals it has adopted under FEECA and the progress toward meeting these goals. Section 553.975, Florida Statutes, requires the commission to prepare a biennial report on the savings derived from the efficiency standards for lighting equipment, showerheads, and refrigerators enumerated in Section 553.963, Florida Statutes, the Energy Conservation Standards Act.

Type(s) of GHG Reductions

TBD

Estimated GHG Reductions and Costs or Cost Savings

PRELIMINARY ESTIMATES

ESD – 12 DSM/Energy efficiency programs, goals for electricity	2017	2025	Units
GHG Emission Savings	16.03	35.42	$MMtCO_2e$
Residential	7.9	17.5	$MMtCO_2e$
Commercial	6.5	14.4	$MMtCO_2e$
Non-government	5.0	11.1	$MMtCO_2e$
Government	1.5	3.3	$MMtCO_2e$
Industrial	1.1	2.5	$MMtCO_2e$
Net Present Value (2009-2025)		**-$8,767**	$million
Cumulative Emissions Reductions (2009-2025)		277.41	$MMtCO_2e$
Cost-Effectiveness		**-$31.60**	$\$/tCO_2e$

Data Sources:

- Costs and potential of DSM programs
    - ACEEE June 2007. *Potential for Energy Efficiency and Renewable Energy to meet Florida's Growing Energy Demands*
- Costs and potential of DSM programs in other states
    - GDS Associates, Inc. (December 2006), A Study of the Feasibility of Energy Efficiency as an Eligible Resource as Part of a Renewable Portfolio Standard for the State of North Carolina, Report for the North Carolina Utilities Commission. Available at: http://www.ncuc.commerce.state.nc.us/reps/NCRPSEnergyEfficiencyReport12-06.pdf
    - GDS Associates, Inc. (2007) "Electric Energy Efficiency: Potential Study for Central Electric Power Cooperative, Inc.: Final Report," updated September 21, 2007. Available at: www.ecsc.org/newsroom/EfficiencyStudy.ppt
    - Forefront Economics, Inc., H. Gil Peach & Associates LLC, and PA Consulting Group (July 24, 2007), Duke Energy Carolinas DSM Action Plan: South Carolina Draft Report

- *Experience in Other States on Cost of Energy Efficiency:*

Bill Prindle (2007), "Energy Efficiency: The First Fuel in the Race for Clean and Secure Energy," presentation at the National Action Plan for Energy Efficiency Southeast Energy Efficiency Workshop on September 28, 2007. Available at: http://www.epa.gov/solar/pdf/southeast_28sep07/prindle_new_napee_presentation_atlanta_9_28_07.pdf.

Martin Kushler, Dan York, and Patti White (April 2004), *Five Years In: An Examination of the First Half-Decade of Public Benefits Energy Efficiency Policies*, Washington, DC: American Council for an Energy Efficient Economy. Available at: http://www.aceee.org/pubs/u041.htm.

Gene Fry, "Massachusetts Electric Utility Energy Efficiency Database," Massachusetts Department of Telecommunications and Energy, 2003 edition. (Not available online.)

Heschong Mahone Group, Inc. (June 2005), *New York Energy $mart^SM Program Cost-Effectiveness Assessment*, prepared for New York State Energy Research and Development Authority. Available at: http://www.nyserda.org/Energy_Information/ContractorReports/Cost-Effectiveness_Report_June05.pdf.

WGA 2006—Energy Efficiency Task Force Report to the Clean and Diversified Energy Advisory Committee of the Western Governors' Association (January 2006), *The Potential for More Efficient Electricity Use in the Western United States*. Denver, CO: Western Governors' Association. Available at: http://www.westgov./wga/initiatives//%20Efficiency-full.pdf.

GDS Associates, Inc. (December 2006), A Study of the Feasibility of Energy Efficiency as an Eligible Resource as Part of a Renewable Portfolio Standard for the State of North

Carolina, Report for the North Carolina Utilities Commission. Available at: http://www.ncuc.commerce.state.nc.us/reps/NCRPSEnergyEfficiencyReport12-06.pdf

GDS Associates, Inc. (2007) "Electric Energy Efficiency: Potential Study for Central Electric Power Cooperative, Inc.: Final Report," updated September 21, 2007. Available at: www.ecsc.org/newsroom/EfficiencyStudy.ppt

Forefront Economics, Inc., H. Gil Peach & Associates LLC, and PA Consulting Group (July 24, 2007), Duke Energy Carolinas DSM Action Plan: South Carolina Draft Report

Table 2 Estimated Cost of Saved Energy (CSE) from several sources

State/Utility	CSE ($kWh)	Program Year	Source
Western Utilities	0.025	1978–2004	WGA 2006[7]
Northwest Energy	0.02	2006	Montana PSC Docket No.: D2005.5.88 07/12/06[8]
New York	0.03	2004	Heschong Mahone Group, Inc. 2005[9]
Massachusetts IOUs	0.038	2002	Gene Fry 2003[10]
California	0.03	n/a	ACEEE 20004[11]
Connecticut	0.023	n/a	ACEEE 20004
New Jersey	0.03	n/a	ACEEE 20004
Vermont	0.03	n/a	ACEEE 20004
North Carolina	0.029		GDS Associates, Inc. 2006

Quantification Methods:

For the preliminary analysis, the goals for energy savings of ESD-12 were interpreted as % reductions from previous year's electricity sales, subtracted from reference case growth. Total electricity demand could increase year to year if reference case growth projections exceed the electricity savings.

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[7] Energy Efficiency Task Force Report to the Clean and Diversified Energy Advisory Committee of the Western Governors' Association (January 2006), *The Potential for More Efficient Electricity Use in the Western United States*. Denver, CO: Western Governors' Association. Available at: http://www.westgov./wga/initiatives//%20Efficiency-full.pdf.

[8] Available at http://www.psc.state.mt.us/eDocs/.

[9] Heschong Mahone Group, Inc. (June 2005), *New York Energy $mart^{SM} Program Cost-Effectiveness Assessment*, prepared for New York State Energy Rresearch and Development Authority. Available at: http://www.nyserda.org/Energy_Information/ContractorReports/Cost-Effectiveness_Report_June05.pdf.

[10] Gene Fry, "Massachusetts Electric Utility Energy Efficiency Database," Massachusetts Department of Telecommunications and Energy, 2003 edition. (Not available online.)

[11] Martin Kushler, Dan York, and Patti White (April 2004), *Five Years In: An Examination of the First Half-Decade of Public Benefits Energy Efficiency Policies*, Washington, DC: American Council for an Energy Efficient Economy. Available at: http://www.aceee.org/pubs/u041.htm.

Electricity Sales in Reference Case and under ESD-12 goals (GWH per year)

	2010	2015	2020	2025
Reference Case	251,510	280,206	308,654	338,930
ESD-12	251,510	269,255	279,063	289,687

Key Assumptions:

- Cost of saved electricity: $30 / MWh (ACEEE June 2007)
- Avoided costs of electricity: $67 / MWh, see Common Assumptions
- Avoided GHG emissions for electricity: 0.69 MtCO2e/MWh in 2017, 0.63 MtCO2e/MWh in 2025 (preliminary), see Common Assumptions

Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

Pending

Level of Group Support

TBD

Barriers to Consensus

TBD

ESD-13a. Energy Efficiency in Existing Residential Buildings

Policy Description

In 2005 Florida's population was just under 18 million with approximately 7.13 million households. With over 50% of electricity used in homes, focusing attention on energy efficiency improvements to the existing residential home sector has the potential to provide the greatest reduction in electricity usage and associated GHG emissions. Incentives should focus on existing residential.

Policy Design

Goals Measures implemented with low-interest loans will reduce energy consumption in existing homes by X% each year relative to consumption in the prior year (with a baseline to be established against which actual performance would be measured).

Preliminary quantification analysis below is based on energy efficiency measures being implemented in 4% of housing units per year, with each unit reducing energy consumption by 22% on average.

Timing: 10-year program from January 1, 2011 through 2020, with results tracked annually from 2011 through 2030.

Parties Involved: Cities and counties; utilities;, building contractors; remodelers; building designers; architects; engineers; retailers of energy-efficient products; manufacturers of alternative building products; social service organizations, including clubs and religious organizations; FECC; DEP; and the Florida Department of Community Affairs (DCA).

Other: Eligible technologies are to be determined.

Implementation Mechanisms

- Improving energy efficiency in low-income units can provide some of the most cost-effective energy savings in the residential sector. Facilitating access to existing grants and providing new low or zero interest energy efficiency loans can be effective mechanisms through which to realize those savings. These low interest loans can often be facilitated through traditional lending mechanisms,[12] as well as through specially designated funds. In a broader loan program, target loans toward areas that are compatible with desired low-carbon land-use patterns.

[12] For instance, see the Nebraska Dollar Energy Saving Loans, through which the Nebraska State Energy Office purchases half of each energy efficiency loan at a 0% interest rate so that the total interest paid by the borrower is half the market rate.

- Encourage and reward alternative business models aimed at increasing efficiency in the marketplace. For example, the creation of Energy Service Companies (ESCO) in the residential retrofit arena should be promoted as a finance mechanism for home energy-efficient retrofits.
- Implement a net metering program modeled after the successful German solar experience.
- Explore incentives to induce owners and remodeling contractors to improve energy efficiency in existing residential buildings. An initial action that can be taken as a way to "measure" gains in residential buildings would be to establish and maintain an energy consumption baseline by community or region for existing homes. Meaningful benchmarks for community building performance could be established using that baseline. In addition, residential owners and remodelers could use that community baseline to compare with their usage.

On an individual home basis, utilities could be encouraged to establish and provide energy consumption histories for existing residences against which meaningful benchmarks for individual household could be established. It may be possible to use the energy histories to link incentives to measured performance improvements, such as CO_2 emissions avoided.

- Make available history review services and associated energy audits for individual household energy consumption to establish benchmarks for household CO_2 emissions avoidance.
- Design and offer incentives modeled on performance contracting with incentives linked to energy use reductions and associated CO_2 emissions avoided. Incentives may be in the form of tax credits, DSM program support, "green mortgages," and others.
- Provide DSM incentives for compliance with improved design and construction certifications (such as the U.S. Environmental Protection Agency's (EPA's) ENERGY STAR appliance and product programs and other standards). Since these certifications do not guarantee actual performance at the meter, incentives may be linked to demonstrated performance over time (e.g., as a rebate after one year of demonstrated performance), rather than when a certificate is awarded.

Windstorm resistant features; indoor air quality standards; construction waste management; heating, ventilation, and air conditioning (HVAC); and lighting standards including, but not limited to, energy efficiency and occupant health and safety would be developed to complement energy efficiency codes.

Related Policies/Programs in Place

The Florida Building Commission (FBC) to, prior to implementing the goals established in the Florida Energy Efficiency Code for Building Construction, adopt by rule and implement a cost-effectiveness test for proposed increases in energy efficiency. This test shall measure cost-effectiveness and ensure energy efficiency increases result in a positive net financial impact.

Estimated GHG Reductions and Costs or Cost Savings

PRELIMINARY ESTIMATES

ESD – 12 DSM/Energy efficiency programs, goals for electricity	2017	2025	Units
GHG Emission Savings	**5.80**	**8.66**	$MMtCO_2e$
Net Present Value (2009-2025)		**$1,569.9**	$million
Cumulative Emissions Reductions (2009-2025)		91.6	$MMtCO_2e$
Cost-Effectiveness		**$17.14**	$\$/tCO_2e$

Data Sources:

- Costs and potential of DSM programs
  - ACEEE June 2007. *Potential for Energy Efficiency and Renewable Energy to meet Florida's Growing Energy Demands*
  - Additional information provided by Florida Solar Energy Center (Philip Fairey)

Quantification Methods:

See Annex for components of calculations.

Key Assumptions:

Fraction of homes improved per year		**4.00%**	
Average energy savings per housing unit per year, for improved units		4,359.14	kWh/yr
Weighted Average Cost of Saved Electricity		87	$/MWh

Notes: Based on weighted costs and energy savings from packages defined in ACEEE 2007

Package 1- high efficiency air conditioner (SEER 15), reduced leakage in ducts (0.1 to 0.03), ceiling insulation (R30), solar hot water, 50%b fluorescent lighting replacement, programmable thermostat)

Package 2 - package 1 plus cool roof, ENERGY STAR refrigerator, ENERGY STAR ceiling fans, load reduction, window replacement (u=0.39, SHGC=0.4 vinyl), white walls) package 1

Avoided costs of electricity: $67 / MWh, see Common Assumptions.

Avoided GHG emissions for electricity: 0.69 MtCO2e/MWh in 2017, 0.63 MtCO2e/MWh in 2025 (preliminary), see Common Assumptions.

Key Uncertainties

TBD

Additional Benefits and Costs

Affordability issues are to be addressed by the TWG.

Feasibility Issues

TBD

Status of Group Approval

Pending

Level of Group Support

TBD

Barriers to Consensus

TBD

ESD-13b. Incentives for New Residential Buildings and Master Planned Communities Achieving High Energy Performance Standards

Policy Description

Provide incentives to induce building contractors to improve resource and energy efficiency in new residential buildings and Master Planned Residential Communities. This option is focused on encouraging developers and builders to significantly exceed building code requirements and incorporate high-energy performance considerations in community design.

Over the last decade more than one million new homes were built in Florida. The majority of were in master planned community developments, which are uniquely well equipped to integrate energy efficiency into community designs and housing standards. Master planned community developments also strongly influence ongoing community operations and standards through their organizational design of Home Owner Associations (HOA), or Community Development Districts, and through explicit language in recorded Conditions, Covenants, and Restrictions (CC&Rs).

Policy Design

Goals: Energy efficiency in X% of new homes and planned communities will be 10% higher than that required by building code by 2015.

Timing: For new homes, ramp up efficiency improvements above code beginning with 2% in 2010 to 10% in 2015.

Parties Involved: Building contractors, building designers, architects, engineers, developers, retailers of energy-efficient products, manufacturers of alternative building products, utilities to administer benchmark program for CO_2 emissions avoidance, and the FECC.

Other:

Implementation Mechanisms

- Establish and maintain "local" energy-consumption baselines for newly built houses against which meaningful benchmarks for building performance can be established. Use energy tracking to link incentives to measured performance in terms of CO_2 emissions avoided. Establish protocols that warrant and allow for the sale of CO_2 emissions avoided.
- Provide incentives modeled on performance contracting with incentives linked to CO_2 emissions avoided. Incentives can be in the form of tax credits, DSM program support, "green mortgages," and others.
- Provide incentives for compliance with improved design and construction certifications, such as ENERGY STAR, U.S. Green Building Council's (USGBC's) Leadership in Energy

and Environmental Design Green Building Rating System™ for Homes (LEED-H), Florida Green Building Coalition (FGBC) Green Home Designation Standard, and other standards. Since these certifications do not guarantee actual performance at the meter, incentives should be linked to demonstrated performance over time (e.g., as a rebate after a year of demonstrated performance), rather than when a certificate is awarded. Furthermore, the value of certifications should be judged against meaningful benchmarks based on community consumption standards developed for similar classes of homes.

- Developers can readily establish minimum performance standards (e.g., all homes shall be ENERGY STAR qualified) that affect thousands of homes and strongly influence local standards of product performance and tradecraft.
- Provide incentives to induce developers to improve resource and energy efficiency in new master planned residential communities. Establish and maintain "local" energy consumption baselines for newly built houses against which meaningful benchmarks for building performance can be established. Use energy tracking to link incentives to measured performance in terms of CO_2 emissions avoided. Establish protocols that warrant and allow for the sale of CO_2 emissions avoided.
- Provide incentives modeled on performance contracting that are linked to CO_2 emissions avoided. Incentives linked to explicit requirements in the community's legally recorded organizational documents can be in the form of faster permitting, density bonuses, tax credits, community scale DSM program support, "green mortgages" and others.
- Provide incentives for required compliance with improved community design and construction certifications, such as USGBC's Leadership in Energy and Environmental Design Green Building Rating System™ for Neighborhood Development (LEED-ND), FGBC Green Development Standard, Audubon International's Gold Signature program, and others. Since these certifications do not guarantee actual performance at the meter, incentives should be partially linked to demonstrated performance over time (e.g. as a rebate after a year of demonstrated performance), rather than when a certificate is awarded.

Related Policies/Programs in Place

TBD

Type(s) of GHG Reductions

TBD

Estimated GHG Reductions and Costs or Cost Savings

TBD

Data Sources:

Quantification Methods:

Key Assumptions:

Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

Pending

Level of Group Support

TBD

Barriers to Consensus

TBD

ESD-14. Improved Building Codes for Energy Efficiency

Policy Description

Buildings are significant consumers of energy and other resources. Building energy codes can be an effective way to eliminate the least efficient energy approaches in new or renovated buildings. This policy sets a goal for reducing building energy consumption, to be achieved by increasing standards for the minimum performance of new and substantially renovated commercial and residential buildings through the adoption and enforcement of building codes. Building codes would be made more stringent via incorporation of aspects of advanced or next generation building designs and construction standards, such as sustainable design and green building standards.

Policy Design

Goal: HB 697 and HB 7135 call for the energy efficiency requirements of the Florida Energy Efficiency Code be incrementally scaled up to 50% higher than the 2007 Code by 2019. The goal of ESD-14 is to extend the time frame of HB 697 and 7135 beyond 2019 such that energy consumption per square foot of floor space is reduced by 100% from what it was in 2007.

Preliminary quantitative analysis assumes that increase in code stringency continues at rate specified in HB 697, 50% improvement in 2019, followed by 60% improvement in 2022, and 70% in 2026.

TWG members noted that calling for building codes to reach 100% reduction in energy consumption per square foot is equivalent to a 50% reduction in total building electricity demand since the building codes only reach about 50% of the electricity consumed in a building. An alternative suggestion for wording is "extend the time frame and (potentially) activity coverage of HB 697 and 7135 beyond 2019 and to additional end-uses of electricity such that total energy consumption per square foot of floor space is reduced by 50% from what is was in 2007"

Timing: Operational in 2010.

Parties Involved: FBC, DCA, and FECC.

Other: TBD

Implementation Mechanisms

Potential elements of a building code policy include the following:

- Require high-efficiency appliances in retrofits.
- Training of building code and other officials in energy code enforcement.

- Potential measures supporting this option can include consumer education, improved enforcement of building codes, training for builders and contractors, and development of a clearinghouse for information on and to provide access to software tools to calculate the impact of energy efficiency and solar technologies on building energy performance.
- Energy rating systems for existing homes.
- White roofs, rooftop gardens, and landscaping (including shade tree programs).
- High summer roof temperatures increase the need for more electricity for air conditioning, as well as producing black carbon (BC) from updrafts. Incentives for white roofs, rooftop gardens, and landscaping can lower electricity demand.
- Promote installation of ductwork and air handlers in conditioned spaces.
- Approximately half of the energy demand in Florida's homes is for heating and cooling. Air handlers are generally in garages or occasionally in attic spaces. Ductwork is uniformly in attic spaces and exposed to extremes in temperature. The energy costs associated with conduction and leakage can be reduced considerably by moving air handlers and ductwork into spaces within a home's conditioned envelope.
- Identify all barriers to improved efficiency in existing homes and buildings, and implement government programs and policies to overcome these barriers.

Related Policies/Programs in Place

Recently, the Florida legislature passed legislation that sets new energy efficiency standards for the building code. 2008 Florida Energy Bill HB 7135 directs the FBC to select the most recent International Energy Conservation Code (IECC) as a foundation code. HB697 targets a 20% increase in building code energy efficiency standards from 2007 levels by 2010. Furthermore, HB 697 and HB 7135 call for the energy efficiency requirements of the Florida Energy Efficiency Code be incrementally scaled up to 50% higher than the 2007 Code by 2019.

There is a mandatory review of codes every three years to ensure that state and local building codes relating to energy efficiency requirements are always as strict as the more stringent of the IECC or American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) standards.

Type(s) of GHG Reductions

TBD

Estimated GHG Reductions and Costs or Cost Savings

PRELIMINARY ESTIMATES

Recent Actions – Energy efficiency standards for building code	2017	2025	Units
GHG Emission Savings	9.22	23.09	$MMtCO_2e$
Net Present Value (2009-2025)		$162	$million

Cumulative Emissions Reductions (2009-2025)	174.9	$MMtCO_2e$
Cost-Effectiveness	**$0.93**	$\$/tCO_2e$

ESD-14 Expanded Building Codes	2017	2025	Units
GHG Emission Savings	**0.00**	**7.31**	$MMtCO_2e$
Net Present Value (2009-2025)		**$33**	$million
Cumulative Emissions Reductions (2009-2025)		14.5	$MMtCO_2e$
Cost-Effectiveness		**$2.29**	$\$/tCO_2e$

Data Sources:

- Florida Executive Order 07-127, *Establishing Immediate Actions to Reduce Greenhouse Gas Emissions within Florida,*
- Florida HB 697
  - http://www.myfloridahouse.gov/Sections/Documents/loaddoc.aspx?FileName=_h0697er.xml&DocumentType=Bill&BillNumber=0697&Session=2008
- HB 7135
- ACEEE June 2007. *Potential for Energy Efficiency and Renewable Energy to meet Florida's Growing Energy Demands*
- Philip Fairey and Jeff Sonne, May 15, 2007 Effectiveness of Florida's Residential Energy Code: 1979 – 2007, submitted to the Florida Department of Community Affairs

Quantification Methods:

See Annex for components of calculations. For recent actions, assumed that codes would be fully implemented by January 1 of following year. Option is modeled as 60% improvement in 2022, and 70% in 2026.

Key Assumptions:

- Cost of Electricity Savings

	Residential	Commercial	
2009	**$60.0**	**$66.6**	$/MWh
2011	**$61.8**	**$66.6**	$/MWh
2014	**$65.4**	**$66.6**	$/MWh
2017	**$68.8**	**$66.6**	$/MWh
2020	**$72.3**	**$66.6**	$/MWh
2023	**$75.7**	**$66.6**	$/MWh
2026	**$79.2**	**$66.6**	$/MWh

Notes cost increases each year for residential are based on increasing code stringency. Similar information is still to be calculated for commercial.

- Electricity Savings based on code stringency in goals.

- Avoided costs of electricity: $67 / MWh, see Common Assumptions
- Avoided GHG emissions for electricity: 0.69 MtCO2e/MWh in 2017, 0.63 MtCO2e/MWh in 2025 (preliminary), see Common Assumptions

Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

Pending

Level of Group Support

TBD

Barriers to Consensus

TBD

ESD-15. Training and Education for Building Operators and Community Association Managers

Policy Description

Energy Management Training/Training of Building Operators. Energy Management Training provides administrative and technical training for energy managers, school officials, building operators, and others responsible for energy-efficient facility operation. This policy could include

- Training commercial building energy managers, for example, by making use of the building operator training and certification program developed in the Pacific Northwest;
- Training industrial energy and facility managers in techniques for improving the efficiency of their steam, process heat, pumping, compressed air, motors, and other systems, perhaps dovetailing with the US DOE in this area; and
- Creation of a credentialing program for certification of "green" energy managers that requires not only training, but also examinations to qualify.

Policy Design

Goals: Not quantifiable.

Timing: Programs in place by the end of 2010.

Parties Involved: Energy managers, school officials, building operations, community colleges, universities, and the Florida Department of Education (DOE).

Other: TBD

Implementation Mechanisms

TBD

Related Policies/Programs in Place

TBD

Type(s) of GHG Reductions

TBD

Estimated GHG Reductions and Costs or Cost Savings

TBD

Data Sources:

Quantification Methods:

Key Assumptions:

Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

Pending

Level of Group Support

TBD

Barriers to Consensus

TBD

ESD-16. More Stringent Appliance/Equipment Efficiency Standards

Policy Description

Appliance efficiency standards reduce the market cost of energy efficiency improvements by incorporating technological advances into base appliance models, thereby creating economies of scale. Appliance efficiency standards can be implemented at the state level for appliances not covered by federal standards, or standards can be jointly developed by multiple states. Electrical appliances span all sectors and may include refrigerators, freezers, dishwashers, stoves, ovens, clothes washers and dryers, room air conditioners, and pool heaters.

Policy Design

Goals: In the residential sector, reduce the energy used by appliances by an additional 1.0% every year (relative to consumption in the prior year) from 2010 through 2030. In the commercial and industrial sectors, reduce the energy used by appliances by an additional 0.5% every year (relative to consumption in the prior year) from 2010 through 2030.

Timing: Standards effective January 1, 2010.

Parties Involved: State government agencies, including the FECC, DEP, the Florida Public Service, the Florida Energy Office, the Department of Labor and Industry, and the Department of Commerce; **[need TWG review of names of appropriate departments]** appliance manufacturers and appliance/equipment industry representatives; and the DEP and the Florida Department of Revenue (DOR).

Other:

Implementation Mechanisms

To ensure that appliances purchased in Florida maximize the cost-effective potential for energy efficiency and minimize GHG emissions, the following policy prescriptions should be considered.

- Improve appliance standards for appliances not regulated by federal standards.
- Lobby for more stringent appliance standards at the federal level. Require the preferential procurement of ENERGY STAR products if available (e.g., equipment, appliance, or technology) if state funds are involved (e.g., state purchasing contracts, state grants, or loans)
- Provide exemptions of Florida state sales tax, whether temporary or permanent, for ENERGY STAR-certified products.
- Establish and enforce higher than federal and state level appliance and equipment standards (or standards for devices not covered by federal standards).

- Join with other states in adopting higher standards.
- Require high-efficiency appliances in new construction and retrofits.
- Require uniform labeling standards for appliances.
- Set state minimum efficiency standards for appliances not covered by federal standards, as recommended by Appliance Standards Awareness Program (ASAP),[13] by 2010.
- Double the market penetration of ENERGY STAR appliances in purchases made in the residential, commercial, and industrial sectors, where applicable, up to 100%, by 2015.

Consumer education is a potential supporting measure for this option.

Related Policies/Programs in Place

TBD

Type(s) of GHG Reductions

TBD

Estimated GHG Reductions and Costs or Cost Savings

TBD

Data Sources:

Quantification Methods:

Key Assumptions:

Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

[13] See http://www.standardsasap.org/documents/a062_sc.pdf. The analysis recommends standards for the following products: bottle-type water dispensers, commercial boilers, commercial hot-food-holding containers, compact audio products, DVD players and recorders, liquid immersion distribution transformers, medium-voltage dry-type distribution transformers, metal halide lamp fixtures, pool heaters, portable electric spas, residential furnaces and boilers, residential pool pumps, single-voltage external AC-to-DC power supplies, state-regulated incandescent reflector lamps, and walk-in refrigerators and freezers.

Status of Group Approval

Pending

Level of Group Support

TBD

Barriers to Consensus

TBD

ESD-17. Consumer Education Programs

Policy Description

In many cases, the ultimate effectiveness of emissions reduction activities depends on providing information and education to consumers regarding the energy and GHG emissions implications of consumer choices. Public education and outreach is vital to fostering a broad awareness of climate change issues and effects (including co-benefits, such as clean air and public health) among the state's citizens. Such awareness is necessary to engage citizens in actions to reduce GHG emissions in their personal and professional lives. Public education and outreach efforts should integrate with and build on existing outreach efforts involving climate change and related issues in the state. Ultimately, public education and outreach will be the foundation for the long-term success of all of the mitigation actions proposed by the Florida Action Team, as well as those that may evolve in the future.

- Institute mandatory labeling programs for time-of-sale (TOS) energy use for all consumer products, devices, and systems (including all buildings) that can be evaluated by either testing or computer simulation and educate consumers on the use and implications of these labels.
- Create a public inquiry "information center" where interested public can obtain factual answers (vetted by experts in the field) to common energy-efficiency and GHG questions.
- Provide public education materials and energy information collateral that can be used at local levels by minimally trained "speakers."
- Create an awards program that recognizes businesses and individuals who exhibit exemplary behavior or performance, with respect to local energy and climate public-education program or in local GHG or energy use reduction programs.
- Provide state-sponsored Public Service Announcement (PSA) programs.

Policy Design

Goals: Not quantifiable.

Timing: Begin outreach programs in 2010.

Parties Involved: FECC, consumers, retailers, manufacturers, K-12 public schools, community colleges, universities, and the Florida DOE.

Other: TBD

Implementation Mechanisms

TBD

Related Policies/Programs in Place

The DEP and a consultant are formulating a statewide campaign on energy efficiency that incorporates radio, television, and the Internet.

Type(s) of GHG Reductions

TBD

Estimated GHG Reductions and Costs or Cost Savings

TBD

Data Sources:

Quantification Methods:

Key Assumptions:

Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

Pending

Level of Group Support

TBD

Barriers to Consensus

TBD

ESD-18. Incentives to Promote Implementation of Customer-Sited Renewable Energy Systems

Policy Description

Distributed electricity generation sited at residences, commercial, and industrial facilities, and powered by renewable energy sources (typically solar, but also wind, small hydroelectric power sources, or fuels derived from waste biomass), displaces fossil-fueled generation and avoids electricity transmission and distribution losses, thus reducing GHG emissions. This policy can also encourage consumers to switch from using fossil fuels to using renewable fuels in applications such as water, process, and space heating, as well as to supply new energy services using fuels that produce low or no GHG emissions.

Policy Design

Goals: 200,000 MWh of customer-sited renewable energy systems added by 2021.

Timing: 200,000 MWh[14] added every year from 2012 through 2021, for a cumulative amount by the end of 2021 of 200,000 MWh.

Parties Involved: All power producers operating qualifying renewable facilities at residences and commercial and industrial facilities in Florida; the FECC.

Other: TBD

Implementation Mechanisms

Increasing the use of renewable energy applications in homes, businesses, and institutions in Florida can be achieved through a combination of regulatory changes and financial incentives to overcome barriers posed by high up-front costs and other aspects of distributed renewable-energy systems, in order to promote stronger market for Florida. Potential elements of this option include

- Programs targeted at specific customer sectors (residential, commercial, industrial), or specific markets within sectors.
- Tax credits and utility or other incentives to lower the first cost of distributed energy systems to users.
- Rewarding innovative financing mechanisms and business models dedicated to fostering the growth of renewable energy implementation.

[14] 20,000 MWh is 5.4 MW using a capacity factor of 42%, which is based on the simple average of 30% for wind, 20% for solar PV, 37% for solar thermal, and 80% for biomass gasification and municipal solid waste. Geothermal is not included due to the lack of geothermal potential in Florida.

- Provision of subsidies to renewable energy generators at $0.005/kWh for each kWh of electricity generated from a qualifying renewable facility.
- Training and certification of installers and contractors.
- German-style net metering and other pricing arrangements. Allow third-party systems for renewable power production that are located on user facilities to be eligible for net metering.
- Creation of interconnection standards.
- Creation and support of markets for biomass fuels.

Examples of customer-sited renewable energy systems include:

- Solar roofs, such as roofing materials with built-in solar photovoltaic (PV) cells, or solar PV panels erected on roofs.
- Solar water heating and solar space heating systems.
- Wind power systems, particularly for rural areas.
- Generation, space, or water heating systems fueled by waste biomass.

IRP (see option ESD-7) could support development and installation of these technologies, if they meet the stated objectives of the IRP process.

Related Policies/Programs in Place

FECC oversees Florida's grant program that has resulted in a 1 MW solar system that is the largest in the Southeast. In addition, the FECC administers a solar rebate program ($5 million). This program provides $500 per residential solar hot-water heater, and $4 per watt for PV (up to a cap of $20,000 for residential and $100,000 for commercial residents). Rebates are released on a first come, first served basis. As discussed above, the PSC recently approved tariffs to expedite interconnection for its net metering program. Various utilities provide rebates for solar applications, as well as geothermal pumps and cool roofs, among others. For more information see: http://www.dsireusa.org/library/includes/map2.cfm?CurrentPageID=1&State=FL&RE=1&EE=1

Type(s) of GHG Reductions

TBD

Estimated GHG Reductions and Costs or Cost Savings

TBD

Data Sources:

Quantification Methods:

Key Assumptions:

Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

Pending

Level of Group Support

TBD

Barriers to Consensus

TBD

ESD-21. Rate Structures and Technologies to Promote Reduced Greenhouse Gas (GHG) Emissions

Policy Description

Option 1—TOU rates typically price electricity higher at times of greater power demand, and thus better reflect the actual cost of generation. TOU rates may or may not have a significant impact on total GHG emissions, but do affect on-peak power demand, and thus both the need for peaking capacity and fuel for peaking plants. Consider pilot programs with real-time pricing that are coupled with "smart-grid" concepts and strategies, including plug-in hybrid vehicle management.

Option 2—Tiered (increasing block) rates for electricity and natural gas use provide affordable rates for base usage for consumers, but rise with increasing consumption, hence providing a built-in rate incentive for energy conservation and energy efficiency.

Policy Design

Goals: TBD and baseline year to be established.

Timing: New rate structure will begin on January 1, 2010.

Implementing Parties: All Florida utilities and utility customers, and the PSC.

Other: TBD

Implementation Mechanisms

IRP (see option ESD-7) could support development and installation of these rate structures and technologies, if they meet the stated objectives of the IRP process.

Related Policies/Programs in Place

According to the PSC all the investor-owned utilities (FPL, PEF, TECO Energy, Gulf Power, and Florida public utilities) offer TOU rates. However, it is primarily offered in the commercial sector with minimal offerings in the residential sector. Only FPL and PEF have a tiered rate structure for the residential sector.

Type(s) of GHG Reductions

TBD

Estimated GHG Reductions and Costs or Cost Savings

TBD

Data Sources:

Quantification Methods:

Key Assumptions:

Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

Pending

Level of Group Support

TBD

Barriers to Consensus

TBD

ESD-22. Demand-Side Management (DSM)/Energy Efficiency Programs, Funds, or Goals for Natural Gas

Policy Description

This option has most of the same attributes and options for design elements and implementation as ESD-12, but focuses on increasing investment in DSM programs related to the use of natural gas, propane or liquefied petroleum gas (LPG), and fuel oil, through programs run by utilities or others, energy efficiency funds, and energy efficiency goals.

Policy Design

Goals: In each sector—residential, commercial, and industrial—reduce the consumption of natural gas, relative to consumption in the prior year, by 1.0% per year through 2012, then by 1.5% per year through 2015, and then 2.0% per year thereafter through 2030.

Timing: 2010 is the first year of compliance.

Parties Involved: All natural gas utilities (public and private), regulators, and customers (all sectors).

Other: TBD

Implementation Mechanisms

TBD

Related Policies/Programs in Place

TBD

Type(s) of GHG Reductions

TBD

Estimated GHG Reductions and Costs or Cost Savings

TBD

Data Sources:

Quantification Methods:

Key Assumptions:

Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

Pending

Level of Group Support

TBD

Barriers to Consensus

TBD

ESD-23. Decoupling

Policy Description

Traditional regulatory frameworks tie a utility's recovery of fixed costs of providing service (e.g., infrastructure costs) to the quantity of energy sold. Thus, there is a perverse incentive for utilities to increase sales in order to boost revenues and minimize investments in energy efficiency (which will simply lead to lower than anticipated sales). This option includes the implementation of cost recovery rules that "decouple" the level of utility sales from net revenues earned by investor-owned utilities.

Implement rate structures and utility cost-recovery rules that "decouple" the level of gas and electric utility sales from the net revenues earned by utilities. Decoupling should be geared exclusively to removing barriers to utility investment in programs to increase their customers' energy efficiency and reduce customer loads. Decoupling mechanisms should be carefully designed in order to avoid, as much as possible, adverse economic impacts on ratepayers so that factors other than energy efficiency investments (e.g., economic downturns) do not adversely affect rates, and to assure that the decoupling mechanism is fair to consumers and shareholders.

Policy Design

Goals: Not quantifiable; the resulting declines in energy use will be tied more directly to utility DSM programs (ESD-12 and ESD-22) that will be more successful due to decoupling.

Timing: New regulatory framework in place by January 1, 2010.

Parties Involved: Florida utilities and the PSC.

Other: TBD

Implementation Mechanisms

TBD

Related Policies/Programs in Place

During the 2008 legislative session, the legislature passed and Governor Crist signed HB 7135 that ordered the PSC to analyze utility revenue decoupling and provide a report and recommendation to the Governor, the President of the Senate, and the Speaker of the House of Representatives by January 1, 2009. The PSC will begin holding workshops on this in early August.

Type(s) of GHG Reductions

TBD

Estimated GHG Reductions and Costs or Cost Savings

TBD

Data Sources:

Quantification Methods:

Key Assumptions:

Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

Pending

Level of Group Support

TBD

Barriers to Consensus

TBD

Acronyms and Abbreviations

ASAP	Appliance Standards Awareness Program
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
BC	black carbon
CC&R	Conditions, Covenants and Restrictions
CH_4	methane
CHP	combined heat and power
CO_2	carbon dioxide
DCA	[Florida] Department of Community Affairs
DEP	[Florida] Department of Environmental Protection
DG	distributed generation
DOR	[Florida] Department of Revenue
DSM	demand-side management
EPA	[U.S.] Environmental Protection Agency
EPAct	Energy Policy Act of 2005
EPS	environmental portfolio standard
ESCO	Energy Service Company
ESD	Energy Supply and Demand
FBC	Florida Building Commission
FDOT	Florida Department of Transportation
FECC	Florida Energy and Climate Commission
FEECA	Florida Energy Efficiency and Conservation Act
FEO	Florida Energy Office
FESC	Florida Energy Systems Consortium
FHBA	Florida Home Builders Association
FGBC	Florida Green Building Coalition
FPL	Florida Power & Light [Company]
FRCC	Florida Reliability Coordinating Council
GHG	greenhouse gas
HOA	Home Owners Association
HVAC	heating, ventilation, and air conditioning
IECC	International Energy Conservation Code
IRP	Integrated Resource Planning
JEA	Jacksonville Electric Authority
LA	license application
LEED	Leadership in Energy and Environmental Design Green Building Rating System™
LEED-H	LEED for Homes
LEED-ND	LEED for Neighborhood Development
LPG	liquefied petroleum gas

NRC	[U.S.] Nuclear Regulatory Commission
OUC	Orlando Utilities Commission
PEF	Progress Energy Florida
PPSA	Power Plant Siting Act
PRC	[Florida] Public Regulatory Commission
PSA	Public Service Announcement
PSC	[Florida] Public Service Commission
PUC	Public Utilities Commission
PV	photovoltaic
R&D	research and development
RAEL	Renewable and Appropriate Energy Laboratory
RECs	Renewable Energy Certificates
REPP	Renewable Energy Policy Project
RPS	renewable portfolio standard
TBD	to be determined
TOS	time-of-sale
TOU	time-of-use
TWG	Technical Work Group
US DOE	U.S. Department of Energy
US DOT	U.S. Department of Transportation
US GBC	U.S. Green Building Council
WTE	waste-to-energy

Units of Measure

\$/tCO_2e	dollars per metric ton of carbon dioxide equivalent
Btu	British thermal unit
kWh	kilowatt-hours
MMtCO_2e	million metric tons of carbon dioxide equivalent
MW	megawatt
MWh	megawatt hours [one thousand kilowatt-hours]

ANNEX – ADDITIONAL DETAILS ON ASSUMPTIONS AND QUANTIFICATION STEPS

Estimate of Mitigation Option Costs and Benefits for Florida for the Energy Supply & Demand (ESD) Technical Work Group

ESD - 6: Nuclear Power

Date Last Modified: *8/11/08 10:08 PM*
Modified By:

INPUT specific to this policy o
INPUT from other sheets

Key Inputs (i.e., Data and Assumptions)				Units
Retail Sales (GWh)				
From FL Draft Inventory and Forecast				
Goals				
Nuclear Power			**2,200**	MW in 2020
From FL ESD Policy Options, ESD-6 Nuclear Power				
Costs (2005$/MWh)			**88**	2006$/MWh
Preliminary estimate - Average of costs from Moody's and Progress Energy				
Capacity Factor			**92%**	
From FL ESD Policy Options, ESD-6 Nuclear Power				
Avoided Energy Cost				
Avoided Delivered Electricity Cost			**$67**	$/MWh
Notes				

Calculation of Energy Production	Annual In 2017	Annual In 2025	Cumulative 2009-2025	Units
Total Nuclear Power (GWh)	0	17,730	106,381	GWh
Nuclear Power A (in 2020)	0	17,730	106,381	GWh
Nuclear Power B (in xxxx)	0	0	0	GWh
% of projected sales	0%	5%	n/a	% per projecte
Total Nuclear Power	0	2,200	n/a	MW
Nuclear Power A (in 2020)	0	2,200	n/a	MW
Nuclear Power B (in xxxx)	0	0	n/a	MW

Calculation of Costs	Annual In 2017	Annual In 2025	Cumulative 2009-2025	Units
Nuclear Power Cost	0	1,566	n/a	$million
Nuclear Power A (2017)	0	1,566	n/a	$million
Nuclear Power B (2019)	0	0	n/a	$million

Calculation of Avoided Energy	Annual In 2017	Annual In 2025	Cumulative 2009-2025	Units
Nuclear, Avoided Energy Costs	0	-1,181	-7,084	$million

Calculation of GHG Emissions Reductions	Annual In 2017	Annual In 2025	Cumulative 2009-2025	Units
Nuclear, Avoided Emissions	0	11	69	MMtCO2

Results	Annual In 2017	Annual In 2025	Cumulative 2009-2025	Units
Nuclear Power Scenario				
GHG Emissions Reductions	**0.0**	**11.2**	**69.21**	$MMtCO_2e$
PV, Gross Cost			**4,879**	Million $
PV, Gross Benefits			**-3,679**	Million $
Net Present Value (2009-2025)			**1,200**	Million $
Cost-Effectiveness			**17.33**	$\$/tCO_2e$

ESD-12. Demand-Side Management (DSM)/Energy Efficiency Programs, Funds, or Goals for Electricity

ESD-12: DSM/Energy Efficiency Programs, Funds, or Goals for Electricity: < All Sector >

Date Last Modified: *8/11/08 10:35 PM*
Modified By:

Key Inputs (i.e., Data and Assumptions)		In 2017	In 2025	Units
Projected Retail Sales (GWh)		**291,254**	**338,930**	GWh
Goals				
Goals			**0.25%**	in 2010
			1.00%	in 2012
			1.50%	in 2015
			2.00%	in 2025
From ESD TWG policy options document				
Annual Ramp In			0.25%	2010
Notes			0.63%	2011
initial target of 0.25% in 2009 gradually increasing to 1% in 2015 and then to 1.5% in 2020.			1.00%	2012
			1.17%	2013
			1.33%	2014
			1.50%	2015
			1.55%	2016
			1.60%	2017
			1.65%	2018
			1.70%	2019
			1.75%	2020
			1.80%	2021
			1.85%	2022
			1.90%	2023
			1.95%	2024
			2.00%	2025
Annual Increase			0.25%	in 2010
			0.38%	2011 - 2012
			0.17%	2013-2015
			0.05%	2016-2025
Cost of Saved Energy			**30**	$/MWh
Source: ACEEE 2007. Potential for Energy Efficiency and Renewable Energy to Meet Florida's Growing Energy Demand				
Utility Cost of Saved Energy			18	$/MWh
CCS Assumption. See Cell A423 in Cross-Policy tab for "Ratio between Ratepayer Cost and Participant Cost"				
This is not used currently, but could be used if TWG wants to know how much utility has to spend.				
Avoided Energy Cost				
Avoided Delivered Electricity Cost			$67	$/MWh
From Common Factors tab.				
EE Savings Attrition Effects				
Annual reduction of savings from measures applied in a given year			**3.5%**	% per year
Average lifetime of DSM Measures			**14**	years
Source: ACEEE 2007. Potential for Energy Efficiency and Renewable Energy to Meet Florida's Growing Energy Demand				

Annual Average Electricity Consumption by Sector between 2009 and 2020

	Share
Residential	49%
Commercial	41%
Industrial	7%
Other	3%
Total	100%

Based on forecasted consumption data in I&F. We used the average consumption for each sector between 2010 and 2(

T&D Electricity Loss	5.3%	2015 value used
From Common Factors		

Calculated Assumptions				Units
Adjusted Retail Sales	**272,950**	**289,687**		GWh
Adjusted Retail Revenues	**0**	**0**		

Calculation of Energy Savings	Annual In 2017	Annual In 2025	Cumulative 2009-2025	Units
Annual (cumulative) Energy Savings (GWh)	**22,031**	**52,945**	**395,925**	GWh
2009 Single year savings				
2010 Single year savings				
2011 Single year savings				
2012 Single year savings				
2013 Single year savings				
2014 Single year savings				
2015 Single year savings				
2016 Single year savings				
2017 Single year savings				
2018 Single year savings				
2019 Single year savings				
2020 Single year savings				
2021 Single year savings				
2022 Single year savings				
2023 Single year savings				
2024 Single year savings				
2025 Single year savings				
Annual (cumulative) Energy Savings (GWh) at Gen	**23,273**	**55,929**	**418,245**	GWh
Note: this includes 5% line loss				
Residential				
Commercial				
Non-gov.				
Gov.				
Industrial				
Savings as % of Projected Sales	**7.6%**	**15.6%**	**-**	

Calculation of Costs	Annual In 2017	Annual In 2025	Cumulative 2009-2025	Units
Total Cost of EE	**661**	**1,588**	**11,878**	$million
Note: the cost to the entire system or society including participant costs				
Utility Cost of EE	**397**	**953**	**7,127**	$million
Note: these data are used for estimating the impact of DSM investment by utilities relative to utility revenues				
EE Investment as % of Projected "Adjusted" Utility	**0%**	**0%**	**-**	

Calculation of Avoided Energy	Annual In 2017	Annual In 2025	Cumulative 2009-2025	Units
Avoided Energy Costs	**-1,550**	**-3,724**	**-27,851**	$million

Calculation of GHG Emissions Reductions	Annual In 2017	Annual In 2025	Cumulative 2009-2025	Units
Avoided Emissions	**16**	**35**	**277**	MMtCO2
Notes				

Results	Annual In 2017	Annual In 2025	Cumulative 2009-2025	Units
Scenario for this sheet:				
GHG Emissions Reductions	**16**	**35**	**277**	$MMtCO_2e$
PV, Gross Cost			**6,519**	Million $
PV, Gross Benefits			**-15,287**	Million $
Net Present Value (2009-2025)			**-8,767**	Million $
Cost-Effectiveness			**-32**	$/tCO2e

Estimate of Mitigation Option Costs and Benefits for ESD GHG Analysis

ESD-13a **Energy Efficiency for Existing Residential**

Date Last Modified: *8/9/2998 A Bailie*

Key Data and Assumptions	2017	2025/all	Units
First Year Results Accrue		**2009**	
Based on goal set in Mitigation Option Design for RCI-7 (version dated 10/27/06) that reads "Ramp up program starting in 2007 to full effectiveness by 2012, except where noted otherwise".			
Electricity	**2017**	**2025/all**	**Units**
Levelized Cost of Electricity Savings For Package 1		**$100**	$/MWh
From ACEEE 2007, package includes high efficiency air conditioner (SEER 15), used leakage in ducts (0.1 to 0.03), ceiling insulation (R30), solar hot water, 50%b fluorescent lighting replacement, programmable thermostat)			
Levelized Cost of Electricity Savings For Package 2		**$70.0**	$/MWh
From ACEEE 2007, package includes package 1 plus cool roof, ENERGY STAR refrigerator, ENERGY STAR ceiling fans, load reduction, window replacement (u=0.39, SHGC=0.4 vinyl), white walls)			
Avoided Electricity Cost		**$67**	$/MWh
See "AvCost" and "Common Factors" worksheets in this workbook.			

Other Data, Assumptions, Calculations	2017	2025/all	Units
Existing Housing units in Florida 2008?		**6,200,000**	
Average energy consumption per existing housing unit per year		**19,462**	kWh/yr
P Fairey, Florida Solar Energy Center, calculations for ACEEE 2007 report			
Estimated number of residential units that are retired per year		**4%**	
Assumption based on average lifespan of 25 years			
Total "Existing" Housing Units in Florida	4,293,711	3,097,438	
Calculated based on estimates above.			
Energy savings per housing unit for packages of energy efficiency measures			
Package 1		3,504.00	kWh/yr
Package 2		6,497.00	kWh/yr
Package 1, excluding solar hot water system		1,724.00	kWh/yr
Packages defined in ACEEE 2007			
Package 1- high efficiency air conditioner (SEER 15), reduced leakage in ducts (0.1 to 0.03), ceiling insulation (R30), solar hot water, 50%b fluorescent lighting replacement, programmable thermostat)			
Package 2 - package 1 plus cool roof, ENERGY STAR refrigerator, ENERGY STAR ceiling fans, load reduction, window replacement (u=0.39, SHGC=0.4 vinyl), white walls)			
Reference case improvements in energy efficiency			
Fraction of homes improved per year		**0.05%**	
Average energy savings per housing unit per year, for improved units		1,724.00	kWh/yr
Cost of Saved Electricity		N/A	$/MWh
Placeholder assumptions, energy savings based on Package 1 excluding solar hot water system			

ESD-13a improvements in energy efficiency

Fraction of homes improved per year	**4.00%**	
Average energy savings per housing unit per year, for improved units	4,359.14	kWh/yr
Weighted Average Cost of Saved Electricity	87	$/MWh

Placeholder assumptions, energy savings based on package 1 to package 2 ratios assumed in ACEEE 2007,

package 1	*71%*
package 2	*29%*

Checks, referring to total number of improved/renovated homes

Fraction of homes improved by 2025	*65%*
Number of home improved annually	*251100*

Reference case - Implied electricity savings in exisiting housing units *First-year savings--not cumulative.*	**3.70**	**2.67**	GWh/yr
Recent Actions - Implied electricity savings in exisiting housing units *First-year savings--not cumulative. [NOT YET USED]*	**-**	**-**	GWh/yr
ESD 13a - Implied electricity savings in exisiting housing units *First-year savings--not cumulative.*	**748.68**	**540.09**	GWh/yr

Implied Cumulative Impacts of Option, Existing residential units (Electricity savings)

Reference case	**39.4**	**64.2**	GWh
Recent Actions	**-**	**-**	GWh
ESD-13a option	**7,977.4**	**12,983.5**	GWh

Annual costs

Reference case	**N/A**	**N/A**	million $
Recent Actions	**-**	**-**	million $
ESD-13a option	**695.8**	**1,132.5**	million $

Annual benefits (avoided costs of electricity)

Reference case	**N/A**	**N/A**	million $
Recent Actions	**-**	**-**	million $
ESD-13a option	**531.2**	**864.6**	million $

ESD 13a

TOTAL Reduction in Electricity Sales	7,977	12,984	GWh (sale
Reduction in Generation Requirements	8,419	13,682	GWh (gene
GHG Emission Savings	6	9	$MMtCO_2e$

Economic Analysis

Net Present Value (2009-2025)	**$1,569.9**	$million
Cumulative Emissions Reductions (2009-2025)	91.6	$MMtCO_2e$
Cost-Effectiveness	**$17.14**	$/tCO_2e$

Summary Results for ESD-13a	**2017**	**2025**	**Units**
Total for ESD 13a Option			
GHG Emission Savings	**5.80**	**8.66**	$MMtCO_2e$
Net Present Value (2009-2025)		**$1,569.9**	$million
Cumulative Emissions Reductions (2009-2025)		91.6	$MMtCO_2e$
Cost-Effectiveness		**$17.14**	$/tCO_2e$

Estimate of Mitigation Option Costs and Benefits for ESD GHG Analysis

ESD-14 **Building Energy Codes**

Date Last Modified: 8/8/2008 A Bailie

Key Data and Assumptions				Units
First Year Results Accrue			**2009**	
Electricity				
		Residential	Commercial	
Levelized Cost of Electricity Savings	2009	**$60.0**	**$66.6**	$/MWh
	2011	**$61.8**	**$66.6**	$/MWh
	2014	**$65.4**	**$66.6**	$/MWh
	2017	**$68.8**	**$66.6**	$/MWh
	2020	**$72.3**	**$66.6**	$/MWh
	2023	**$75.7**	**$66.6**	$/MWh
	2026	**$79.2**	**$66.6**	$/MWh

Residential, based on ACEEE report. (See Note 1, below.) not accounting for tax credits
Commercial - same as avoided electricity cost, since energy savings based on economic potential

Avoided Electricity Cost	**$67**	$/MWh

Weighted average over total 2007-2020 electricity savings for this policy in each sector. See common assumptions ("Common Factors" worksheet in this workbook).

Results	2017	2025	Units
Electricity			
Recent Actions not included in forecast			
Reduction in Electricity Sales: Residential	4,743	12,934	GWh (sales)
Reduction in Electricity Sales: Commercial	7,979	21,762	GWh (sales)
Reduction in Electricity Sales: Industrial	0	0	GWh (sales)
TOTAL Reduction in Electricity Sales	12,722	34,696	GWh (sales)
Reduction in Generation Requirements	13,389	36,468	GWh (generati
GHG Emission Savings	**9.22**	**23.09**	$MMtCO_2e$
Savings due to Additional Effort in ESD-14			
Reduction in Electricity Sales: Residential	0	4,096	GWh (sales)
Reduction in Electricity Sales: Commercial	0	6,891	GWh (sales)
Reduction in Electricity Sales: Industrial	0	0	GWh (sales)
TOTAL Reduction in Electricity Sales	0	10,987	GWh (sales)
Reduction in Generation Requirements	0	11,548	GWh (generati
GHG Emission Savings	**0.00**	**7.31**	$MMtCO_2e$
Economic Analysis (for Electricity Savings due to Recent Actions)			
Cost of Saved Electricity			
Residential	326	935	$million
Commercial	531	1,449	$million
Savings from Avoided Electricity Generation	847	2,310	$million
Net Present Value (2009-2025)		**$161.9**	$million
Cumulative Emissions Reductions (2009-2025)		174.9	$MMtCO_2e$
Cost-Effectiveness		**$0.93**	$\$/tCO_2e$
Economic Analysis (for Electricity Savings due to Additional Effort in ESD-14)			
Cost of Saved Electricity			
Residential	0	310	$million
Commercial	0	459	$million
Savings from Avoided Electricity Generation	0	732	$million
Net Present Value (2009-2025)		**$33.2**	$million
Cumulative Emissions Reductions (2009-2025)		14.5	$MMtCO_2e$
Cost-Effectiveness		**$2.29**	$\$/tCO_2e$

Summary Results for ESD-14	2017	2025	Units
Recent Actions Not Included in Forecast (Current/planned building code changes)			
GHG Emission Savings	**9.22**	**23.09**	$MMtCO_2e$
Net Present Value (2009-2025)		**$162**	$million
Cumulative Emissions Reductions (2009-2025)		174.9	$MMtCO_2e$
Cost-Effectiveness		**$0.93**	$/tCO_2e$
Total for Additional Effort in ESD-14			
GHG Emission Savings	**0.00**	**7.31**	$MMtCO_2e$
Net Present Value (2009-2025)		**$33**	$million
Cumulative Emissions Reductions (2009-2025)		14.5	$MMtCO_2e$
Cost-Effectiveness		**$2.29**	$/tCO_2e$

<u>NOTES AND DATA FROM SOURCES</u>

Note on Overall Approach to Analysis

The following information was provided in Philip Fairey and Jeff Sonne, May 15, 2007 *Effectiveness of Florida's Residential Energy Code: 1979 – 2007*, submitted to the Florida Department of Community Affairs. This information is based on information in the report, ACEEE June 2007. *Potential for Energy Efficiency and Renewable Energy to meet Florida's Growing Energy Demands*

Table D. Projected Cost-Effective Residential Energy Savings Potential for Florida

New Home Efficiency	kWh Saved per Home per Year (Statewide Average)	2023 Statewide Savings (GWh)	Economic Savings Potential (% of Total Residential Electricity Potential)	Cost per kWh Saved	% applicabl
Energy Star Home (15% savings)	*2,021*	*5,764*	*11%*	*$ 0.06*	100%
Tax Credit Eligible Home (25% savings)[a]	*1,857*	*2,715*	*5%*	*$ 0.03*	50%
40% Savings Home[b]	*1,998*	*584*	*1%*	*$ 0.07*	10%
Total Savings (GWh)		**53,054**	**100%**	**$ 0.049**	
% Savings (% of 2023 Projected Sales)		**34%**			9063

[a] Savings are incremental to Energy Star Homes.
[b] Savings are incremental to Tax Credit Eligible Homes.

% applicable refers to fraction of homes built between 2008 and 2023 that meet the standard in the ACEEE estimates taken from page 57 of ACEEE June 2007 report. Since these fractions are roughly equivalent to the Building Code improvements called for in HB/SB 697, we assume the total GWh saved are a rough approximation for the residential portion of the existing building code improvements

year	efficiency improvement on 2007 code	kWh per home per year	number of homes	GWh saved in that year	cost per kWh saved	
source of info	*HB/SB 697*	*table above and calculations*	*P. Fairey estimates*	*calculation*	*and calculations*	
2009	15%	2021	160000	323	$ 0.0600	
2011	20%	2695	160000	431	$ 0.0618	
Tax credit eligible		3877	160000	620	$ 0.0650	** ignore tax credits
2014	30%	4042	160000	647	$ 0.0654	
2017	40%	5389	160000	862	$ 0.0688	
40% savings		5876	160000	940	$ 0.0700	
2020	50%	6737	160000	1078	$ 0.0723	
2023	60%	8084	160000	1293	$ 0.0757	
2026	70%	9431	160000	1509	$ 0.0792	

The ACEEE 2007 report also estimate the following potential economic potential for energy efficiency in new commercial buildings for 2023.

Table 3

	Small Office kWh/year	large office kWh/year	large hotel kWh/year	small retail kWh/year	large retail kWh/year	restaurant kWh/year	school kWh/year	hospital kWh/year
New Building								
baseline energy	60318	1121008	3484331	90149	1431837	241115	119957	8795278
new package sa	21630	319091	957498	41355	643377	75046	42837	2526488
new package sa	35.9%	28.5%	27.5%	45.9%	44.9%	31.1%	35.7%	28.7%
Statewide savings in 2023								
GWh	2979	2365	2758	2559	2504	2284	1362	1324
total (GWH)	18135	ACEEE estimate this to 14% of projected sales in 2023						

For preliminary estimates, use ACEEE value for 2023 and use the residential calculations to provide an estimate of savings in prior and subsequent years. Assuming the commercial savings in ACEEE report represent similar level of improvement as the residential savings

New Option - ESD 14

According to the Policy Design "The goal of ESD-14 is to extend the timeframe of HB 697 and 7135 beyond 2019 such that energy consumption per square foot of floor space is reduced by 100% from what it was in 2007.
Assume this target continues to advance by 10% every three years to meet the 100% goal by 2035
so improvement by 2026 is 70% better than 2007. See calculations in table above

For commercial, use the residential improvements compared to 2023 without expansion of building codes as the basis for estimating commercial savings in 2023 and subsequent years.