TREASURE COAST REGIONAL PLANNING COUNCIL

M E M O R A N D U M

To: Council Members AGENDA ITEM 8

From: Staff

Date: February 20, 2009 Council Meeting

Subject: Report on Florida Renewable Energy Potential Assessment

Introduction

At the December 12, 2008 Council meeting, Commissioner Coward requested that staff provide a summary of a new report, the Florida Renewable Energy Potential Assessment. The assessment was prepared by Navigant Consulting, Inc., who was retained by Lawrence Berkeley National Laboratory on behalf of the Florida Public Service Commission (FPSC). The study was supported by the FPSC and Florida Governor's Energy Office. The final draft of the assessment was released on December 30, 2008. The full 310-page assessment report is available on the FPSC website (www.psc.state.fl.us). This report summarizes key findings of the assessment report and discusses items relevant to the Treasure Coast Region.

Purpose of the Study

The purpose of the Florida Renewable Energy Potential Assessment was to examine the technical potential for renewable energy in Florida, and to evaluate potential adoption of renewable energy under various scenarios. The main tasks of the study were:

Task 1: Identify renewable energy resources currently operating in Florida, and those that could be developed in Florida through the year 2020.

Task 2: Establish estimates of the quantity, cost, performance, and environmental characteristics of the renewable resources currently operating in Florida, and those that could potentially be developed through the year 2020.

Task 3: Gather data to compare renewable energy generation sources to traditional fossil fuel energy generation on a levelized cost of energy (LCOE) basis. LCOE is the revenue, per unit of energy, required to recoup a plant's initial investment, cover annual costs, and provide equity investors their expected rate of return.

Task 4: Conduct a scenario analysis to examine the economic impact of various levels of renewable generation that could potentially be developed through the year 2020.

Renewable Energy Resources

The assessment report evaluated the following renewable energy resources:

Resource	Subset	Notes
Solar	Photovoltaics (PV)	Covers rooftop residential, rooftop commercial and ground mounted applications
Solar	Concentrating Solar Power (CSP)	Focuses on integrated solar combined cycle applications in which a parabolic trough system provides heating to the steam cycle of a combined cycle plant
Solar	Solar Water Heating	Only covers systems greater than 2 MW in size. Less than 2 MW is being covered by a separate study in support of the Florida Energy Efficiency and Conservation Act.
Wind	Onshore	Only looked at Class 2 wind power and above resources (i.e., greater than or equal to a wind speed of 12.5-14.3 miles per hour at 50 meters above sea level)
Wind	Offshore	Only looked at Class 4 wind power and above resources (i.e., greater than or equal to a wind speed of 15.7-16.8 miles per hour at 50 meters above sea level)
Biomass	Solid Biomass	Examines a broad range of feed stocks and conversion technologies, including municipal solid waste
Biomass	Landfill Gas	
Biomass	Anaerobic Digester Gas	
Waste Heat	N/A	Focuses on waste heat resulting from sulfuric acid conversion processes
Ocean	Wave Energy	
Ocean	Ocean Current	
Ocean	Thermal Energy Conversion	
Ocean	Tidal Energy	

Existing Capacity and Technical Potential of Renewable Energy Resources

The assessment report provided estimates of the total existing megawatts (MW) of generating capacity and technical potential of generation from renewable energy resources in 2020. These estimates are summarized in the following table:

Resource	Existing Capacity (MW)	Technical Potential Capacity by 2020 (MW)
Solar – Photovoltaics	1.8	89,000
Solar –Water Heating > 2 MW	0	1,136
Solar – Concentrating Solar Power	0	380
Wind – Onshore	0	186
Wind – Offshore	0	40,311
Biomass – Municipal Solid Waste	520	1,377-2,471
Biomass – Agricultural Byproducts	191	2,712-8,287
Biomass – Wood Products	380	1,870-2,993
Biomass – Landfill Gas	55	110
Biomass – Anaerobic Digester Gas	0	35
Waste Heat	370	140
Ocean Current	0	750
Hydro	62	N/A
Total	1579.8	138,007-145,799

The study found that solid biomass leads Florida's installed capacity base for renewable energy generation. Solar technologies, including residential rooftop, commercial rooftop, and ground-mounted photovoltaic systems have the largest renewable energy technical potential in Florida. Offshore wind, including wind projects that could be installed in water less than 60 meters deep, has the second largest technical potential for renewable energy in Florida. Of the ocean resources considered, ocean current is the only technology that will have a technical potential by 2020.

Key Drivers Impacting Renewable Energy Development in Florida

The study identified the following ten drivers that could impact renewable energy development in Florida:

Drivers	Definition and Explanation
Commodity Prices	Level of inflation in commodity prices (including steel, concrete, and oil, but not natural gas, coal or nuclear materials) will influence renewable energy and traditional power installed costs over time.
Consumer Demand	Degree of consumer and societal demand/support for renewable energy (e.g., through green marketing programs) and environmentally friendly energy policies can influence renewable energy adoption.
Fossil Fuel Prices	In addition to future renewable energy installed costs, renewable energy technology's competitiveness with fossil fuels out into the future will drive their adoption.
Greenhouse Gas Policy	This driver is based on Navigant Consulting's assessment that national or regional greenhouse gas policy is highly likely by 2020. It examines the aggressiveness of this policy, which will influence the cost of electricity generation from traditional fuels against which renewable energy competes.
Load Growth	The rise in electricity demand, based on established rates of economic, population, and electricity consumption growth (including the impacts of efficiency and smart grid) can influence renewable energy demand.
Financial Incentives	Strength of the federal and state policies providing financial incentive for renewable energy projects will drive renewable energy competitiveness. The focus is on select incentives: the federal production tax credit (PTC), investment tax credit (ITC), as well as the state PTC, ITC, and sales tax exemption.
Renewable Energy Regulatory Framework	The scope and form of renewable energy regulation can influence renewable energy adoption. This driver will primarily focus on the creation of a Renewable Portfolio Standard and the resulting renewable energy credit (REC) market.
Renewable Energy Tech Improvements	Renewable energy technologies' installed costs change over time (driven by learning curve impacts, efficiency improvements, and technology breakthroughs), which alters their competitiveness relative to traditional generation and therefore influences adoption.
Credit Markets	The availability of and cost of debt financing will influence renewable energy project economics.
Transmission Investment	Development, or lack, of adequate transmission capacity to allow continued growth in renewable electricity generation and delivery can impact renewable energy adoption.

Navigant Consulting considered the drivers with the highest potential impacts on renewable energy adoption and the highest level of uncertainty to be: 1) fossil fuel prices, 2) the cost of carbon under greenhouse gas emissions policies, 3) renewable energy financial incentives, 4) credit markets, and 5) the renewable energy regulatory framework, which includes the rate cap established for the purchase of renewable energy credits by investor owned utilities. The report considered these to be the key drivers

likely to impact the development of renewable energy. Navigant Consulting then used sets of assumptions and varied the input related to each key driver to develop model scenarios to characterize the development of renewable energy as Unfavorable, Mid-favorable, and Favorable. These scenarios are summarized as:

- Unfavorable – low fossil fuel prices, 1 percent rate cap, no extension of current government renewable incentives, tight financial markets, and carbon pricing of $10/ton by 2020;

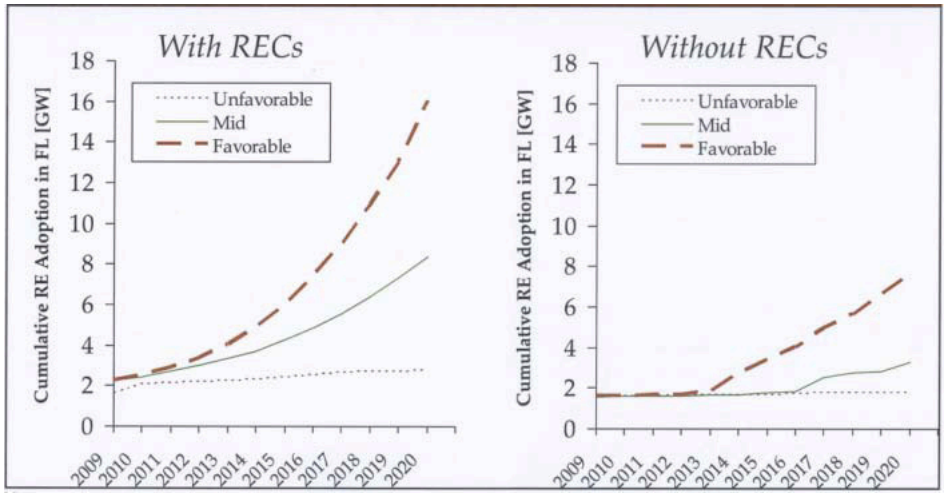
- Mid-favorable – mid range fossil fuel prices, 2 percent rate cap, partial extension of government renewable incentives, moderate financial markets, and carbon pricing of $30/ton by 2020; and

- Favorable - high fossil fuel prices, 5 percent rate cap, government renewable incentives extended through 2020, widely available debt and equity, carbon pricing of $50/ton by 2020.

For all technologies except customer-sited photovoltaics, Navigant Consulting compared the LCOE of a renewable energy technology to that of the traditional technology it would likely compete against, and assumed adoption commenced when the renewable energy technology's LCOE became less than the competing traditional technology's LCOE. Based on previous studies, Navigant Consulting found that simple payback is the most valid metric to look at photovoltaic adoption. Therefore, for photovoltaics, they used a model that calculates simple payback taking into account installed costs, photovoltaic output, building load profiles, incentives, etc.

Navigant Consulting then analyzed this information using technology adoption curves to predict the rate of adoption of renewable energy resources under Unfavorable, Mid-favorable, and Favorable scenarios. Results of this analysis are summarized in the following illustration:

Potential Cumulative Renewable Energy Capacity in Florida
With and Without Renewable Energy Credits (REC)



The results indicate that between 1.8 and 16 Gigawatts (GW) of renewable energy could be installed in Florida by 2020, depending on the scenario. Under the Unfavorable scenario for renewable development, renewable energy in Florida could be 5 percent of investor-owned utility retail sales by 2020. Under the Mid-favorable scenario, renewable energy in Florida could be 11 percent of investor-owned utility retail sales by 2020. Under the Favorable scenario, renewable energy in Florida could be 24 percent of investor-owned utility retail sales by 2020.

The use of RECs has the potential to substantially increase the rate of renewable energy adoption in Florida. The use of RECs is being considered in the FPSC's Draft Renewable Portfolio Standard Rule, which is currently under review. If adopted, investor-owned utilities would purchase RECs from owners of facilities producing renewable energy. The analysis used REC expenditures ranging from $174 to 205 Million/Year for the Unfavorable scenario; $273 to 393 Million/Year for the Mid-favorable scenario; and $225 to 1,053 Million/Year for the Favorable scenario.

Navigant Consulting found that renewable energy development would be expected to develop more extensively under a scenario with high fossil fuel prices, a 5 percent rate cap on RECs, government incentives extended through 2020, and widely available debt and equity at lower cost. The Florida renewable energy resources with the most achievable potential under the economic and policy scenarios are: (1) ground mounted solar photovoltaic; (2) biomass – direct combustion; (3) biomass – waste to energy; and (4) waste heat from sulfuric acid conversion processes.

Key Results Identified in the Report

- Onshore wind represents a small opportunity in terms of megawatts available, but can be competitive with financial incentives.

- Confining the definition of eligible resources to those located in the state would drastically reduce the technical potential from offshore wind and ocean current power.

- Waste heat, repowering with biomass, co-firing with biomass, anaerobic digester gas facilities (installed in a waste water treatment plant), and landfill gas are competitive by 2020 in all cases.

- With the exception of the Unfavorable scenario without RECs, ground mounted photovoltaic becomes competitive at some point during the years of this analysis.

- This analysis does not include the potential renewable energy available from solar water heating systems less than 2 MW, because this information was not available at the time of the study.

Recommendation

For information only.