Memorandum

MIAMI-DADE COUNTY

Date: October 8, 2014

To: Honorable Chairwoman Rebeca Sosa
and Members, Board of County Commissioners

From: Carlos A. Gimenez
Mayor

Subject: Green Energy Farms Report

The attached report responds to Miami-Dade County Board of County Commissioners (Board) Resolution No. R-47-13 which directed the County administration to conduct a study on the creation of green energy farms in Miami-Dade County's agricultural areas and to specifically accomplish the following:

- Conduct a study on the feasibility of creating green energy farms, including but not limited to solar panel farms and biofuel opportunities, in the agricultural areas of Miami-Dade County.
- Investigate existing and potential sources of funding or assistance from local, state, and federal governments and non-profit organizations.
- Explore existing and potential tax exemptions for owners of agricultural property who establish such green energy farms.

Key findings of the report include:

- The majority of the agricultural land in Miami-Dade County does not experience sufficient wind velocity or consistency to allow for the effective production of wind energy.
- Solar Power holds great promise for the local production of green energy since it capitalizes on South Florida's abundant natural resource of sunlight. However, legislative changes may be necessary to implement large scale solar energy projects in Florida.
- Harvesting of crops for the production of biofuels can provide an additional revenue source for farmers, however, not all biomass crops are suitable for use in Miami-Dade County due to local growing conditions.
- Local production of biofuel is hampered by the limited availability of biorefineries capable of processing the feedstocks most suitable to Miami-Dade County.

c: Jack Osterholt, Deputy Mayor
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Christopher Agrippa, Clerk of the Board

Green Energy Farms Report

August 2014

Miami-Dade County Department
of Regulatory and Economic Resources

This report was prepared in coordination with:

Miami-Dade County Department of Regulatory and Economic Resources
- Planning Division (Lead) – Office of Sustainability and Metropolitan Planning
- Agricultural Manager's Office
- The University of Florida's Institute of Food and Agricultural Sciences (UF/IFAS)

Miami-Dade County Office of Management and Budget
- Grants Coordination

Miami-Dade County Public Works and Waste Management

Florida Power and Light

State of Florida Energy Office

Executive Summary

This report responds to Miami-Dade County Board of County Commissioners (BCC) Resolution No. R-47-13 which directed the County administration to conduct a study on the creation of green energy farms in Miami-Dade County's agricultural areas and to specifically accomplish the following:

- Conduct a study on the feasibility of creating green energy farms, including but not limited to solar panel farms and biofuel opportunities, in the agricultural areas of Miami-Dade County.
- Investigate existing and potential sources of funding or assistance from local, state, and federal governments and non-profit organizations.
- Explore existing and potential tax exemptions for owners of agricultural property who establish such green energy farms.

Consistent with Board Resolution No. R-47-13, this report focuses on green technologies with general applicability in agricultural areas including wind energy, solar power and biomass. Because renewable resources vary considerably from one geographic location to another, optimal siting of renewable energy systems requires knowledge of the specific resource characteristics (availability, magnitude, and variability). Therefore, this report introduces relevant case studies to provide insight into how the technology is currently being used and an analysis of the opportunities and constraints for implementation of the various technologies in Miami-Dade County. Finally the reports presents a list of funding options and recommendations on how to incentivize the use of renewable energy, remove current roadblocks and fill the existing policy gaps.

Key findings of the report include:

- The majority of the agricultural land in Miami-Dade County does not experience sufficient wind velocity or consistency to allow for the effective production of wind energy.
- Solar Power holds great promise for the local production of green energy since it capitalizes on South Florida's abundant natural resource of sunlight. However, legislative changes may be necessary to implement large scale solar energy projects in Florida.
- Harvesting of crops for the production of biofuels can provide an additional revenue source for farmers; however, not all biomass crops are suitable for use in Miami-Dade County due to local growing conditions.
- Local production of biofuel is hampered by the limited availability of biorefineries capable of processing the feedstocks most suitable to Miami-Dade County.

Key recommendations of the report include:

1) Variety Trials: The County should continue to partner with area universities to conduct additional variety trials to determine which energy crops offer the greatest potential in the County and whether crop adaptations are needed to make it more suitable. In addition to crops, other potential feedstocks should be studied to determine the right place, scale,

and application, including an understanding of the current barriers and estimated resource needs.

2) Inform and Connect Farmers: The County should continue to partner with area universities to develop an outreach campaign to inform farmers of techniques for cultivating energy crops and opportunities to utilize green technology applications in farm operations.
3) Study Biorefinery Development: The development of a local biorefinery is an important step towards making the local production of biomass cost competitive by reducing transportation costs. The County can play a pivotal role in advancing the development of local renewable energy sources by providing incentives or partnering with the private sector to promote the development of a new biorefinery or modification of an existing biorefinery to provide for the local processing of agricultural feedstocks.
4) Incentivize and Utilize Green Energy. The County should incentivize and utilize green energy through the following:
    - Partnering with operators on appropriate grant opportunities.
    - Supporting legislation and incentives that would facilitate the placement and operation of green energy facilities.
    - Partner with area universities to seek funding for further research into the viability of local energy crops.
    - Assist with, to the extent possible, County permitting for the installation and/or development of green energy production facilities including bio-fuels.
    - Provide appropriate incentives and training for the development of the production of green energy and bio-fuels. Such incentives may include loan funds and tax incentives.
    - Create a market for locally produced bio-fuels through consumption by the County.
    - Promote the use of local biofuels by County businesses and partners.
5) Foster the Development of New Green Ideas. Miami-Dade County should continue to market the assets that make it uniquely poised to be an incubator for the development of new green ideas.
6) Support a Renewable Portfolio Standard. The County may urge the state legislature to pass a Renewable Portfolio Standard to increase demand for alternative energy. Implementing such a standard would encourage the growth of renewable energy by requiring utilities to generate a certain percentage of their power from renewable sources. Florida is now in the minority of states that have yet to pass a Renewable Portfolio Standard.
7) Power Purchase Agreements. The County may take actions to urge the Florida legislature to make distributed solar power more economically feasible for property owners by allowing Power Purchase Agreements or similar third party mechanisms. This would be the single most important issue to resolve in order to promote the wide spread deployment of solar power in our community.

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I. Introduction

On January 23, 2013, the Miami-Dade Board of County Commissioners (BCC) adopted Resolution No. R-47-13 which directed County administration to conduct a study on the creation of green energy farms in our agricultural areas, including funding sources and tax exemptions to encourage such green energy farms. This report is provided in response to Resolution No. R-47-13 (Attachment 1).

There are approximately 78,000 acres of land designated as "Agriculture" on the Comprehensive Development Master Plan (CDMP) located outside of the Urban Development Boundary. Where compatible with agricultural uses, the production and utilization of renewable energy could help to diversify and strengthen the County's agriculture industry as well as reduce our dependence on foreign fuels and improve our resilience for emergency management in instances of fuel/power service and supply interruptions due to human/natural disasters.

Miami-Dade County has taken numerous steps to explore local energy sources that would meet the needs of our growing population. In 2007, the BCC adopted Resolution No. R-461-07 which directed County administration to complete a biofuel production feasibility study. In response, a memorandum was provided to the BCC on July 28, 2009 that looked specifically at the feasibility of producing biodiesel locally from three possible feedstock sources; algae, jatropha, and yellow/brown grease. The findings presented in the memorandum (Attachment 2), are referenced throughout this report.

Through recent initiatives, the BCC has acknowledged the importance of encouraging the development of alternative energy sources to meet the County's overall sustainability goals. In March 2014, the BCC adopted Resolution No. R-226-14 accepting *GreenPrint: Our Design for a Sustainable Future* (GreenPrint) which established a community-wide plan to meet local sustainability goals. Noting the need to reduce the County's dependence on imported traditional fossil fuels such as oil, natural gas, and coal, GreenPrint recommends strategies to stimulate and expand our local alternative fuel (biodiesel/waste-based biodiesel) and renewable energy industries such as enacting legislation to remove obstacles.

Another recent initiative, the Southeast Florida Regional Climate Action Plan (RCAP), was adopted by the BCC on April 02, 2013. RCAP resulted from a four-County compact aimed at building community resilience to climate change. The RCAP includes the goal of adopting policies to facilitate the development of locally-sourced sustainable alternative fuels, defined as those achieving a reduction in lifecycle greenhouse gas emissions when compared to conventional fossil fuels *(RCAP Goal EF-6)*. The RCAP also includes the goal of providing incentives to growers/land owners to manage agricultural lands to lessen impacts of climate change regionally and provide environmental benefits which may include the development of wind farms and biofuels *(RCAP Goal AG-4)*.

New technological advancements are making the prospect of alternative energy development attractive, both economically and environmentally. A proactive approach to the local

development and processing of alternative energy sources would allow the County to have greater control over its energy future. The table below provides an overview of the advantages and disadvantages of the three technologies addressed in this report: wind energy, solar energy and biomass. Through advancements in renewable energy research and technology additional options may become available in the near future.

	Advantages	Disadvantages
Wind Energy	• Small footprint, • Economical, • No air emissions or hazardous waste, • Uses almost no water	• Miami-Dade County does not have winds at a sufficient velocity and on a consistent basis to allow for cost-effective wind energy generation. • The greatest wind velocities are typically along shoreline areas and might not be located in designated agricultural areas. • Federally categorized as poor to marginal wind power class in Miami-Dade County
Solar Energy	• Utilizes Florida's abundant resource – sunshine. • Miami-Dade has an average of 5.62 solar hours a day. • No air emissions or hazardous waste, • Flexible – can be produced and used by/for individuals or commercial enterprises. • When located within building footprint (such as solar panels on a roof), solar projects have minimal impact on the environment. • Can operate independently of existing grid.	• Sunlight is not distributed evenly and consistently throughout the year or geographically within Miami-Dade. • A large surface area is required to collect the energy at a useful rate. • Solar panels are still relatively costly, although prices continue to decrease. • Certain solar installations require extensive ground area that may increase impervious surfaces resulting in increased flooding, reductions in ground water infiltration and loss of viable farm land.
Biomass	• Lower fuel cost and lower emissions depending on the type of biomass and the types of fuels or energy sources that it replaces. • Burning fossil fuels and biomass both generate air emissions because they release carbon dioxide (CO_2), a greenhouse gas. However, when plants that are the sources of biomass are grown, a nearly equivalent amount of CO_2 is captured through photosynthesis and stored in the plants. Therefore, sustainable cultivation and harvesting of biomass can result in no net increase in CO_2 emissions. • Biomass production can provide additional revenue source to farmers, especially when produced as a cover or secondary crop.	• Not all biomass crops are suitable for use in Miami-Dade County due to local growing conditions, • Volatility in biomass crop markets causes fluctuations in value, • Potential for biomass crops to displace food crops, • Requires an industrial-type facility for processing. • Each of the different forms and uses of biomass impact the environment in a different way, making it more difficult to assess net sustainability benefits. • Some biomass crops may be exotic/invasive plant species in our tropical climate,

There are currently two electrical utility companies operating in Miami-Dade County, Florida Power and Light, an investor-owned utility, and the City of Homestead Electric Utility, a municipal utility. In 2011, the City of Homestead Electric Utility served approximately 22,000 customers in Miami-Dade County. The remaining 1.024 million electrical customers are served by Florida Power and Light.

II. Relevant Policies and Incentives

Federal Policies and Incentives

- The national ***Renewable Fuel Standard (RFS) Program*** was developed to increase the volume of renewable fuel that is blended into transportation fuels. Any party that produces gasoline for use in the United States, including refiners, importers, and blenders (other than oxygenate blenders), is considered an obligated party under the RFS Program. Under the RFS Program, 16.55 billion gallons of renewable fuel must be used in 2013 with the volume increasing to 36 billion gallons by 2022.

- In 2012, the Federal government put in place more stringent ***Corporate Average Fuel Economy (CAFE) Standards*** for vehicles that will require automakers to almost double the average fuel economy of new vehicles by 2025. The CAFE Standards also provide credits for alternative fuel vehicles. The new regulations are expected to spur the production of more electric and alternative fuel vehicles.

State Policies and Incentives

- ***Feed-In-Tariffs (FIT).*** A renewable energy policy that offers guarantee of payment to renewable energy developers for the electricity they produce. Feed-in tariffs (FITs) are the most widely used policy in the world for accelerating renewable energy (RE) deployment, accounting for a greater share of renewable energy development than either tax incentives or renewable portfolio standard (RPS) policies. Successful Feed-in Tariff policies typically include three key provisions: (1) guaranteed access to the grid; (2) stable, long-term purchase agreements (typically, about 15-20 years); and (3) payment levels based on the costs of renewable energy generation. On March 2009 Gainesville Regional Utilities started offering a Feed-in Tariff for solar photovoltaic systems (PVs). Methods of compensation for Feed-In Tariff include:

    1. ***Power Purchase Agreements (PPA).*** PPAs are private arrangements between independent power producers and property owners who host solar installations on their sites. The independent power producer pays for the set-up and maintenance while the property owner pays only for the electricity consumed. PPAs are long term contacts between the parties which may reduce the investor's risk. Additional benefits of PPAs are that renewable energy system owners receive the renewable energy credits and tax breaks that come with renewable power generation. Power Purchase Agreements are considered by stakeholders to be a more favorable method for compensation since electricity produced could be paid above retail cost. A 2010 report by the National Renewable Energy Laboratory (NREL) found that "In regulated markets where utilities are granted monopoly rights for selling electricity, definitions of utilities in (Public Utility Commission) regulations or state legislation may prohibit third-party owned solar power generation systems. Because third-party owners of PV systems sell power to the

hosts/end-users via the power purchase agreement, the owners could be considered sellers of electricity and thus utilities." It further states that "In California, Colorado, Florida, and Arizona, utilities were defined as sellers of electricity, which created regulatory uncertainty for developers using the third-party PPA model. Colorado and California found legislative solutions for excluding third-party owned systems from being considered utilities; Colorado codified a previous regulatory solution and California addressed regulation of third-party owned systems several years ago." As stated in the NREL report, Florida has not yet found a solution that would allow the use of the third-party PPA model.[i]

2. ***Net Metering.*** In March 2008, the Florida Public Service Commission (PSC) adopted rules for net metering and interconnection for renewable-energy systems up to two megawatts (MW) in capacity. Net metering is available to customers who generate electricity using solar energy, geothermal energy, wind energy, biomass energy, ocean energy, hydrogen, waste heat or hydroelectric power.

   Florida Power and Light (FPL) has a Net Metering program that allows customers to earn a payback from connecting approved renewable generation systems - such as solar panels - to the electric grid. Currently, Florida Power and Light offers three interconnection tiers: Tier one (0 to 10kW), Tier two (>10 kW to 100 kW and Tier 3 >100 kW to 2 mW). Net metering as an incentive is considered less favorable than other methods of compensation (such as PPAs) since at best the excess electricity produced may be paid at/or below retail value.

- ***Renewable Portfolio Standards (RPS).*** The renewable portfolio standard (RPS) is one of the most common state-level renewable energy policies in the United States today. It is designed to encourage new renewable energy development by establishing a target or quota on the proportion of electricity generation that must come from renewable energy sources by a certain date. The Renewable Portfolio Standard mechanism generally places an obligation on electricity supply companies to produce a specified fraction of their electricity from renewable energy sources. The State of Florida is one of only ten states in the U.S. that does not have a Renewable Portfolio Standard.

  Renewable Portfolio Standards may attract new industries, create jobs, and keep the state businesses competitive while encouraging development of renewable power like wind, solar, and biomass. As it relates to this study, a Renewable Portfolio Standard in Florida could create more incentives and a comprehensive framework for the broad deployment of renewable energy.

Miami-Dade County Policies

The protection and encouragement of agriculture as a viable economic use of suitable lands is a long-standing principle of the Comprehensive Development Master Plan (CDMP). The CDMP indicates that the primary use of lands designated "Agriculture" on the CDMP should be for

agriculture or for uses ancillary to and directly supportive of agriculture and farm residences. Uses ancillary to and directly supportive of agriculture generally include uses such as those uses related to preserving, processing, packaging or selling of agricultural products from Florida as well as the selling/storage of farm equipment. To protect the agricultural industry, uses incompatible with agriculture, and uses and facilities that support or encourage urban development are not allowed in this area. In addition, business and industrial uses are not permitted in these areas unless the use is directly supportive of local agricultural production and complies with environmental standards. When permitted, business and industrial uses (other than agricultural processing facilities for produce grown in Florida) must also be located on an existing arterial roadway.

The area designated as "Agriculture" on the Comprehensive Development Master Plan is primarily located outside of the Urban Development Boundary. Capital investment in transportation projects that encourage development within areas designated "Agriculture" or "Open Land" are discouraged. In addition, the CDMP states that new water supply or wastewater collection lines should not be extended to provide service to land within areas designated "Agriculture" or "Open Land." Certain green energy operations may be limited by the lack of available transportation infrastructure or central water and sewer service in the area outside of the Urban Development Boundary. These limitations are discussed further in the summaries for the various green energy technologies.

III. Wind Energy

Summary:

Wind energy is one of the least expensive and most environmentally-friendly options for energy production. Since wind turbines do not emit harmful air emissions or hazardous waste, they can be safely integrated with agricultural uses without risk to crop production or livestock grazing. In addition, wind turbines have a small footprint allowing them to be co-located with agricultural operations.

The effectiveness of a wind turbine is determined by its ability to capture and convert wind power. Wind turbines work by converting wind power into rotational torque that turns the generator and pushes electrons into the power grid. Larger generators require stronger winds and larger blades to capture more wind energy. Since wind speeds can vary dramatically, the energy generating capacity of wind turbines can also vary dramatically. The stronger the wind resource, the more electricity will be generated. In order to determine if a wind energy system is feasible there must be an adequate wind supply. Areas with annual average wind speeds around 6.5 meters per second (m/s) and greater than 80-m height are generally considered to have a wind resource suitable for wind development.[ii] Utility-scale, land-based wind turbines are typically installed between 80 and 100 m high.

As per NREL estimates, an average U.S. household uses about 10,000 kilowatt-hours (kWh) of electricity each year, and a one-megawatt wind turbine can generate between 2.4 million and 4 million kWh annually, depending on the average wind speed at the site. Therefore, a single one-megawatt wind turbine generates enough electricity to power 240 to 400 households. (In Miami-Dade County this amount of electricity would power fewer households since homes in Miami-Dade County typically use 16,000 kWh per year.) Due to the variability associated with wind speeds, the ability of wind energy to replace other sources of power is limited, particularly in areas with low wind speeds. When wind energy is used to contribute to the electrical grid, a backup energy source is often needed to meet user demand during low output periods.

While wind turbines have numerous environmental benefits, they can also have adverse impacts to avian populations when located within bird migration corridors. For example, a study of the Altamont Pass Wind Resource Area in California, which contains 5,400 wind turbines, found that an estimated 1,760 to 4,720 birds are killed each year by the turbines.[iii] However, recent research has shown that adverse avian impacts can be ameliorated through proper risk assessment and regulation of wind projects. In a 2010 report to the Secretary of the Interior, the federally-commissioned Wind Turbine Guidelines Advisory Committee found that "with proper diligence paid to siting, operations, and management of (wind) projects, it is possible to mitigate for significant adverse impacts to wildlife and their habitats."[iv] The report contained a series of recommendations that could be implemented to reduce the adverse avian impacts associated with wind projects. Devices can also be installed on wind turbines that automatically idle the turbine when bird or bat activity is detected in the vicinity.

Case Study: Sugarland Wind Project

The Sugarland Wind Project, a proposed wind farm to be located in the Everglades Agricultural Area of Palm Beach County, would have been the first commercial wind farm in Florida. The project received zoning approval from the Palm Beach County Zoning Commission, however, it was withdrawn by the developer prior to receiving final approval from the U.S. Army Corps of Engineers. The project, as proposed, would have consisted of 114, 475-foot high wind turbines situated on agricultural land leased from farmers and would have co-existed with working sugar cane farms. According to the Sugarland Wind Project website, the project was expected to generate 200 megawatts of domestic energy for up to 60,000 homes (each turbine will produce between 1.5 to 2.3 megawatts of electricity). Environmental groups expressed concerns about the project's potential impacts to avian and bat populations.

Applicability in Miami-Dade County:

As shown on Attachment 3, wind levels in South Florida are significantly lower than the Midwest where the majority of successful wind projects are operating. As indicated in the summary, the capacity of wind turbines drops off dramatically when wind speeds drop below certain levels. According to the National Renewable Energy Laboratory (NREL), wind resources in Florida are not sufficient to support typical wind farms except along the coast and off-shore. If farmers decide to pursue wind farms on agricultural lands, a detailed analysis would be necessary to determine whether wind speeds in the agricultural areas of Miami-Dade County are sufficient to make wind farms economically viable. The development of wind turbines in agricultural areas may provide additional benefits for the agricultural operation. Research has shown that wind turbines might also help agricultural crops stay cooler and dryer, help them fend off fungal infestations and improve their ability to extract growth-enhancing carbon dioxide [CO_2] from the air and soil.[v]

As indicated in the summary, wind turbines can potentially have adverse impacts on avian populations. South Florida represents a significant migratory corridor for both land and water birds. Policies allowing for the development of wind energy farms in the agricultural area of Miami-Dade County should, therefore, also include policies to protect avian populations from adverse impacts.

IV. Solar Power

Summary:

Solar energy can be generated by capturing sunlight through photovoltaic cells, made primarily of silicon, that convert it directly into electricity. Another way that solar energy can be converted into electricity is via solar thermal/electric power plants by concentrating solar energy to heat a fluid and produce steam that is used to power a generator. When converted to thermal (heat) energy, solar energy can be used to: heat water (for use in homes, buildings, or swimming pools), heat spaces (inside homes, greenhouses, and other buildings), and heat fluids (to high temperatures to operate a turbine to generate electricity). The amount of energy generated correlates to the surface area of the photovoltaic panels.

Net metering is available to customers who generate electricity, up to two megawatts, using solar energy, geothermal energy, wind energy, biomass energy, ocean energy, hydrogen, waste heat or hydroelectric power. Net metering as an incentive is considered less favorable than other methods of compensation (such as Power Purchase Agreements) since, at best, the excess electricity produced may be paid at/or below retail value. Power Purchase Agreements (PPAs) are private arrangements between independent power producers and property owners who host solar installations on their sites. The independent power producer pays for the set-up and maintenance while the property owner pays only for the electricity consumed. Power Purchase Agreements are considered to be a more favorable method for compensation over net metering since they offer long-term contracts, tax incentives and allow the electricity produced to be paid above retail cost. Legislative changes may be needed for PPAs to be viable in Florida.

Case Study: Martin Next Generation Solar Plant

According to FPL's website, the Martin Next Generation Solar Plant, near Indiantown, Florida, is the first hybrid solar plant in the world. It's connected to a conventional power plant and directly offsets the burning of fossil fuels. The Martin plant is expected to cut Florida's oil consumption by 600,000 barrels, and save customers $178 million in fuel costs over its lifetime.

Case Study: Stanton Solar Farm

The Orlando Utilities Commission (OUC) Curtis H. Stanton Energy Center is located on 35 acres in east Orange County. The Stanton Solar Farm, a nearly 6-MW array, can generate enough renewable energy to power more than 600 homes. The OUC, a municipally-owned public utility, plans to purchase power generated by the solar farm for the next 20 years. The design includes the ability of the panels to move into a horizontal position at 40 mile per hour sustained wind gusts.

Applicability in Miami-Dade County:

Florida has one of the highest rates of home electricity consumption in the country, due in no small part to the need for air conditioning. The source of Florida's heat – sunshine – is also its most promising source of renewable energy. The abundance of sunshine in South Florida provides an opportunity to harness some of this solar power to meet the electrical energy demands of the population. A 2004 study of small residential solar arrays by the Florida Solar Energy Center found that Florida has 85 percent of the maximum solar energy potential of any place in the country, at 7.2 kilowatt-hours per day.[vi] Attachment 4 shows the solar zones for Florida.

Harnessing solar energy provides great promise for South Florida. One consideration with respect to large-scale solar farms in the County's agricultural areas is the large footprint needed to accommodate them. Given the importance of preserving viable agricultural land in Miami-Dade County, the clearing of large areas of agricultural land for solar panels would not be recommended. On the other hand, harnessing solar resources can help farmers thrive when margins for basic crops are tight. Farmers could install solar panels for their own electricity needs, and join with neighboring landowners in cooperative solar farms.

Smaller solar installations used to offset local energy usage may provide benefits to individual farmers by reducing their operating expenses. While this type of installation is not a revenue making investment, solar options and incentives are an area for further evaluation in promoting the use of solar technology, as many farms have found that utilizing solar technology to meet the electrical needs of the agricultural operation can provide significant cost savings. Solar power can be used to power agricultural irrigation systems, lighting, water heaters, crop drying heaters and other farm needs. Solar panels can also provide power to remote agricultural locations where electric lines do not currently exist. According to the Union of Concerned Scientists, the distance from a power source at which solar power becomes more economical than new transformers and electric lines can be as little as 50 feet.[vii]

Miami-Dade County is taking steps to streamline permitting for solar rooftop installations through a grant received from the Department of Energy. The goal of the grant is to reduce fragmentation in the solar market by transferring proven soft cost reduction strategies across participating jurisdictions, working to ensure consistent implementation of those processes, and dramatically increasing the educational outreach to promote rooftop solar installations using the improved processes. These strategies strive to increase efficiency and cost effectiveness for the direct benefit of our local businesses and residents.

V. Biomass

Summary:

Bioenergy is renewable energy made from any organic material from plants or animals. Sources of bioenergy are called "biomass." Agricultural feedstocks may include plants and plant by-products (bagasse), wood residues, grasses and invasive trees and plants. Other non-agricultural feedstocks include yellow or brown grease, used/recycled oil, tires, solid waste and biogas (such as methane). Biomass is very flexible; it can be used as fuel for direct combustion (biofuels such as bioethanol, biodiesel, and biohydrogen), gasified, used in combined heat and power technologies, or biochemical conversions. Biomass systems can use a specific biomass fuel or two or more biomass fuels can be co-fired.

Technology is ever-changing and, as we strive for cleaner and more renewable sources of fuel, biomass is growing in popularity. Biomass fuels provided about 5% of the energy used in the United States in 2012. Of this, about 45% was from wood and wood-derived biomass, 44% from biofuels (mainly ethanol), and about 11% from municipal waste. In Florida, biomass represents 30% of the electricity generated from renewable resources.[viii]

Since commodity prices can experience extreme fluctuations, the price of biofuel also varies greatly when compared with the price per gallon of fossil fuels. Furthermore, the cost of biomass is directly related to type, moisture content, hauling distance, local supply and demand, and quantity purchased. This uncertainty has, in some cases, stifled investment in green technology. This trend is highlighted in the Case Study portion of this section. Figure 2 shows the July 2013 nationwide average price per gallon (in gasoline gallon equivalents) for various fuels.

Figure 2: *July 2013 Overall Average Fuel Prices on Energy-Equivalent Basis*

Nationwide Average Price in Gasoline Gallon Equivalents	
Gasoline	$3.65
Diesel	$3.50
CNG	$2.14
Ethanol (E85)	$4.57
Propane	$3.77
Biodiesel (B20)	$3.55
Biodiesel (B99-B100)	$4.13

Source: US Department of Energy: Clean Cities Alternative Fuel Price Report (July 2013)

Biomass is a broad term that can involve a myriad of different feedstocks (input), processing techniques and energy outputs. Each of these various inputs, processing techniques and energy outputs have unique advantages and disadvantages which are discussed in detail in this section.

Agricultural Feedstocks:

Energy Crops: There are many crops that may have commercial potential as energy crops but each would need to be vetted for viability, and in some cases optimization/hybridization for local production. The cultivation and processing of energy crops must also be cost-effective for the farmer as well as the processor and the end-user. Cost competitiveness can be an obstacle to alternative fuel production. The price at which biofuel becomes cost effective to produce is tied to the price per barrel of crude oil and the price of the energy crop. Until 2011, a federal tax credit known as the Volumetric Ethanol Excise Tax Credit provided $.45 per gallon for ethanol blending which kept ethanol production more competitive with crude oil. This tax credit expired in December 2011 and has not yet been renewed.

Technological advancements have decreased the production costs of biofuel over the years and costs are expected to be further reduced as new cost-saving advancements emerge. This also needs to be balanced against the risk that replacing food crops for fuel crops may potentially increase food costs. Cover crops are used by many farmers to maintain ideal growing conditions between harvests. Cover crops can provide weed and pest control, prevent soil erosion and balance nutrient levels in the soil. The growing of fuel crops as cover crops may provide an opportunity to develop alternative fuel sources without replacing food crops. In addition, crop by-product can also be used for biofuel production. Crops such as rapeseed (canola) provide an opportunity for use as a cover crop in Miami-Dade County, however, the crop would need to be adapted to grow in the summer, the County's primary fallow period.

Wood: Wood harvested specifically for the purpose of biomass can provide a sustainable feedstock option. A public-private consortium that includes the Common Purpose Institute, University of Florida, Florida Energy Office and several energy companies is experimenting with fast-growing trees as a renewable fuel source for electric utilities. Building on years of research by the University of Florida and Shell Energy, the project aims to cultivate "super trees" that can grow 20 feet a year, with an annual yield of 32 green tons and 16 dry tons of biomass per acre.

Algae: Algae are simple plant cells that are commonly found in bodies of water (both saline and fresh water) across Florida. As algae grow during photosynthesis, they produce oils, ranging from two to thirty percent of their weight, which can be used for the production of biofuel. As shown in Figure 1, oil yield per acre from algae is significantly higher than most energy crops. Recognizing the benefits, several large petroleum companies are investing in algae biofuel research.

Figure 1: Oil Yield per Acre by Crop

Crop	Oil yield gallon/acre
Corn	18
Cotton	35
Soybean	48
Mustard seed	61
Sunflower	102
Rapeseed/Canola	127
Jatropha	202
Oil palm	635
Algae	
10g/m²/day at 15% Triglycerides	1,200
50g/m²/day at 50% Triglycerides	10,000

Source: http://ohioline.osu.edu/aex-fact/pdf/AEX_651_11.pdf

Animal Waste: Animal waste can be converted into biofuel (such as bioethanol, biodiesel, and biohydrogen) or biopower (electricity).

Processing Techniques:

Bio-Refineries: The production of biofuel from biomass requires the use of a refinery. While the environmental risks associated with bio-refineries are lower than petroleum refineries, the bio-refineries should be properly sited and managed to further reduce these risks. The energy source used for heat and power generation is the primary contributor to environmental risks.

Anaerobic Digesters: Anaerobic Digesters for the recovery of biogas have four basic components: a digester, a gas-handling system, a gas-use device, and a storage tank or pond to hold the treated effluent. Anaerobic digestion is used to convert the organism into biogas (a mixture of methane and carbon dioxide). This process is carried out in open lakes or reactor vessels. Anaerobic digesters are often simple non-porous tanks that can be constructed and operated for a relatively low cost. Biogas can be used directly for process heat and steam, upgraded to natural gas specifications or converted to electricity using reciprocating engines, gas turbines, or fuel cells. Biogas may also be catalytically transformed into hydrogen, ethanol, bio-butane or methanol.

Direct to End-User: Biomass feedstock can also be sold directly to end-users that would process the feedstock using boilers, burners, furnaces or other combustion equipment to process the materials.

Energy Outputs:

Liquid fuels derived from biomass are aimed at the transportation market, with the exception of direct burning of used vegetable oil which is used in industrial applications.

Ethanol: For years, ethanol has been the primary biofuel created from biomass. This is primarily due to the fact that most government fuel blending standards and incentives have focused on the production of ethanol. Nearly all ethanol is derived from starch- and sugar-based feedstocks. The sugars in these feedstocks are easy to extract and ferment, making large-scale ethanol production affordable.

Biodiesel: Once refined, biodiesel can be used unblended to power adapted automobiles or blended with conventional diesel fuel to power unmodified diesel engines. Fuel grade biodiesel must meet the industry standard (ASTM D6751) for legal sale and distribution. Several major fuel companies, including BP and Shell, are investing in biodiesel research and production.

Methanol: Methanol can be made from wood via gasification. Although the process has been scientifically proven, there are no commercial facilities in existence. Methanol has similar properties to ethanol, but it is not in the mainstream of commercial motor fuels. Methanol is toxic, and acts aggressively on some synthetic fuel system materials which can hinder its applicability.

Biobutanol: Biobutanol is another liquid alcohol fuel made from the same sources as ethanol. Researchers say it has greater energy content than ethanol.

Biogas: Biogas conversion can be used to generate biofuel, natural gas or electricity by utilizing thermal conversion (heat-based), chemical conversion or biochemical conversion. The EPA's AgSTAR program has a comprehensive handbook on developing biogas technology. The site includes FarmWare, a free decision-making software package that can help farmers assess the feasibility of biogas for their farm.

Heat: Often, thermal oil, steam, and hot gas systems are combined into a single system when different process needs are required. These applications are mainly used in industrial operations. Cogeneration, the simultaneous production of electricity and thermal energy, has been widely used in the United States. However, utility companies usually cite two major drawbacks to cogeneration: (1) industrially generated power is often of low quality and (2) the industrial producer often produces excess power at off-peak times of the day when it is not needed by the utility.

Case Study: Algenol Biofuels Facility, Fort Myers, Florida

In 2010, Algenol Biofuels, Inc. opened a biology and engineering laboratory and operations facility to develop algae-based biofuels. The company also built an Integrated Bio-Refinery next to the facility which allowed Algenol to accelerate commercialization of the biofuel. According to the company's website, their patented technology allows for the production of ethanol from algae for around $1.00 per gallon using sunlight, carbon dioxide and saltwater. The company has found that it can produce 9,000 gallons of ethanol per acre using algae-based technology compared with 4,000 gallons per acre with corn-based ethanol production. The company is also developing algae-based technology to replace petroleum in plastics.

Case Study: Highlands Ethanol

BP and Verenium Biofuels originally announced plans to build a facility in Florida – called Vercipia – in 2008 with the intention of turning 15,000 acres of energy crops into 36 million gallons per year of cellulosic ethanol. This project received a seven million dollar grant from the Florida Energy Office in 2008. This project included a plantation and energy facility. The energy facility was not built during the grant period therefore the recipient received only a portion of the grant funding. The plantation was completed and it was operated by BP until October 2012. BP bought out the 50-50 partnership and continued on its own. On October 2012, BP announced that the company cancelled plans to build an ethanol plant in Highlands County. Although 3,500 acres of land had been planted in energy cane on Lykes Brothers land, BP decided to stop activities on the site.

Case Study: GreenBiofuels

Green Biofuels, LLC is operating a biodiesel facility in Miami-Dade County. The facility is owned by Vigus Global, a Brazilian enterprise. The facility has the capacity of producing 300,000 gallons of ASTM-compliant B100 per month from yellow grease with the possibility of processing additional feedstocks. The facility started test production in 2013 and is expected to gradually increase production as demand grows.

Case Study: United States Sugar Corporation

US Sugar Corporation uses bagasse, the residual from sugarcane stalks, for processing into steam and co-generation of electricity on-site. The energy produced provides power for both the sugar factory and the company's refinery operations. According to the company's website, the boiler used for the processing began operations in 2005 and had an initial cost of $15-20 million. The company's website also states that the boiler processes 4 to 5 million tons of bagasse per year which is equivalent to producing 9,600 megawatts of electricity. In 2008, U.S. Sugar Corp. entered into an agreement with Coskata, Inc. of Warrenville, IL to explore building a 100 million gallon per year cellulosic ethanol facility in Clewiston, Florida that would process sugar cane material into ethanol. The idea was shelved in 2009 when the price of ethanol dropped.

Case Study: Miami-Dade County Public Works and Solid Waste Department (PWWM).

PWWM produces about 70,000 tons per year of biomass fuel at their facilities which is shipped to outside parties (sugar refineries) for electrical generation. Since electrical rates have dropped, their main biomass partner, Okeelanta, is no longer exporting energy, so as of September 2013 they are ordering less biomass from PWWM.

Case Study: Florida Power and Light (FPL)

Half of FPL's regional fleet of on-road vehicles – totaling 2,412 trucks and cars – are powered using biodiesel. FPL's biodiesel hybrids operate on a custom-blended mixture of 20 percent soybean oil and 80 percent diesel fuel. Since 2003, FPL purchased more than 400,000 Gallons/year (B-100).

Case Study: Neptune Industries, Inc.

In 2008, Neptune Industries, Inc. received a $158,000 Farm to Fuels Grant for the development of a pilot-scale closed containment fish-rearing system that used the waste from the fish as fertilizer for algae which, in turn, could be used for the production of biofuel. The company's innovative collection system allowed the fish waste to be captured in a manner that protects water quality. The pilot fish-rearing system was installed in a 30-acre quarry lake in Florida City, however, the company was not able to find a feasible system for the extraction of oil from algae for use in biofuel. The company suffered financial losses shortly after implementing the project and ceased operations shortly thereafter.

Applicability in Miami-Dade County:

As noted earlier, the value of biodiesel is heavily influenced by the commodity price of the feedstock and the price of petroleum oil. Utilizing feedstocks that require less land to cultivate and do not utilize land that would otherwise be dedicated to food crops as well as using a diverse array of feedstocks can help to temper the volatility of biofuel costs. Based on current research, the agricultural feedstocks that appear to hold the greatest promise for the County include algae, boniato and jatropha. These feedstocks thrive or can be adapted to thrive in the County's warm, wet climate. Boniato tested extremely well for ethanol production in variety trials conducted in 2007 by the Agricultural Manager's Office in conjunction with University of Florida/Institute of Food and Agricultural Sciences and local producers. Florida's climate also bodes well for fast-growing energy crops such as sugarcane and sweet sorghum.[ix] Crops such as rapeseed (canola) provide an opportunity for use as a cover crop in Miami-Dade County, however, it would need to be adapted to grow in the summer, the County's primary fallow period. Additional variety trials should be conducted to determine the suitability of various feedstocks in local growing conditions. Crop modifications can be used, where necessary, to adapt the crop to local conditions.

The 'Biodiesel Production and Use in Miami-Dade County' Memorandum presented to the Board in 2009 indicated that algae and jatropha were not economically feasible local feedstock

alternatives for biodiesel production at that time. In the case of algae, aside from the high production costs, no available technology was found to commercially extract the oil from algae to supply a biodiesel plant. The report further noted that jatropha had not yet been adapted to the South Florida environment, therefore adequate yields could not be predicted. Additionally, jatropha is considered toxic and will require special handling during the farming and oil extraction stages.

Miami-Dade County lacks an extensive forestry industry, therefore, opportunities for wood-derived biomass may be limited. Additional studies should be conducted to determine whether unwanted exotics, such as melaleuca, may provide an opportunity for use as woody biomass. Currently, woody biomass moves through the County's Resource Recovery Facility as part of the solid waste stream.

Local production of alternative energy is hampered by the limited availability of bio-refineries capable of processing the feedstocks most suitable to Miami-Dade County. Preliminary research identified only two biorefineries located in Miami-Dade County for the processing of biomass: GreenBiofuels and GreenStar Biodiesel, both of which process commercial feedstocks such as yellow grease from food service operations.

VI. Green Energy Funding

Below is a partial listing of funding opportunities available for the development of green energy farms. Attachment 5 provides a more comprehensive list of possible funding options.

U.S. Department of Agriculture Biorefinery Assistance Program
http://www.rurdev.usda.gov/BCP_biorefinery.html
Status: Open **Deadline:** Open
Award Ceiling: not specified
This program provides loan guarantees for the development, construction, and retrofitting of commercial-scale biorefineries. The program aims to increase the energy independence of the United States; promote resource conservation, public health, and the environment; diversify markets for agricultural and forestry products and agricultural waste materials; and create jobs and enhance economic development in rural America. Eligibility for the Biorefinery Assistance Program is broken into three parts; lenders, borrowers, and projects. All three areas must be met to be considered eligible for the program. Local government entities are considered eligible borrowers. All projects require an independent feasibility study and technical assessment as part of the application. The project must meet the following criteria:

(a) The project must be for the development and construction of commercial-scale biorefineries using eligible technology or retrofitting of existing facilities with eligible technology.
(b) The project must use an eligible feedstock for the production of advanced biofuels and biobased products. Examples of eligible feedstocks include, but are not limited to, renewable biomass, biosolids, treated sewage sludge, and byproducts of the pulp and paper industry.
(c) The majority of the biorefinery production must be an advanced biofuel. A project that creates an advanced biofuel that is converted to another form of energy for sale will still be considered an advanced biofuel.
(d) The project must provide funds of not less than 20 percent of eligible project costs.

U.S. Department of Agriculture Advanced Biofuel Payment Program
http://www.rurdev.usda.gov/BCP_Biofuels.html
Status: Open **Deadline:** Open
Award Ceiling: not specified
This Program provides payments to producers to support and expand production of advanced biofuels refined from sources other than corn kernel starch. The Program supports and helps to ensure the expanding production of advanced biofuels by providing payments to eligible advanced biofuel producers. Additional incentive payments may be made to certain producers who have increased their biofuel output over the previous year's production. Advanced biofuels are produced from renewable biomass crops such as cellulose, sugar and starch (other than ethanol derived from corn kernel starch), hemicelluloses, lignin, waste materials, biogas, butanol, diesel-

equivalent fuel, sugarcane, and nonfood crops such as poplar trees or switchgrass. To be eligible for the Advanced Biofuel Producer Program, an applicant must produce and sell an advanced biofuel. Conditions need to be met for the producer and for the biofuel.

William and Flora Hewlett Foundation

http://www.hewlett.org/programs/environment-program/energy-and-climate

Status: Open **Deadline**: Open

Award Ceiling: not specified

The Hewlett Foundation's Environment Program is committed to reducing these emissions to avoid the most severe effects of climate change. They focus strategies in the following areas: (1) Fossil fuels: Reduce fossil fuel development and use, especially high-carbon fuels; (2) Renewables: Increase renewable energy development and use, (3) Efficiency: Increase energy efficiency, (4) Clean transportation: Increase clean transportation modes and use,

(5) Building broad support: Engage diverse members of the public. The vast majority of foundation grants support organizations that work on policy development and advocacy to help the foundation best reach its goals. No eligibility restrictions outlined in guidelines. If project or organization fits within foundation guidelines, submit a Letter of Inquiry online. Letters of Inquiry are accepted at any time.

U.S. Department of Agriculture (USDA) Rural Energy for America Program (REAP)

http://www.rurdev.usda.gov/BCP_Reap.html

Status: Expired, USDA staff has indicated that it is likely that this program will be refunded.

Award Ceiling: $500,000

The REAP program offers both loan guarantees and grants for the development and construction of renewable energy systems (such as solar panels or anaerobic digesters) and energy efficiency improvement projects (such as installing irrigation pumps, replacing ventilation systems, and conducting energy audits and feasibility studies). All agricultural producers, including farmers and ranchers, who gain 50% or more of their gross income from the agricultural operations are eligible to apply. Small businesses that are located in a rural area can also apply. Rural electric cooperatives may also be eligible to apply. See Attachment 5 for additional details on the REAP program.

U.S. Department of Energy Qualified Energy Conservation Bonds (QECB)

http://www1.eere.energy.gov/wip/solutioncenter/financialproducts/qecb.html

Deadline: open

Award Ceiling: varies; see below

In 2009, the American Recovery and Reinvestment Act allocated $3.2 billion in bond volume for Qualified Energy Conservation Bonds (QECB). QECBs are debt instruments that states, local governments and tribes can issue at extremely low rates to fund energy

conservation projects, including energy efficiency improvements, renewable energy installations, green community programs, and public education campaigns. Each state received a QECB allocation proportionate to its population, which was subsequently sub-allocated to their largest local governments (cities and counties of 100,000 population or more). While a number of localities have successfully used QECBs, much of the $3.2 billion allocation remains unissued. In most states, cities and counties interested in funding energy projects with QECBs can still tap into unused allocations. A QECB issuance takes several months to structure, market, price, and close. Cities and Counties should select eligible projects and consult their bond counsel for more information on the QECB opportunity. There is no federal expiration date after which QECBs may no longer be issued. They can be issued as long as there is an available allocation

Energy Efficiency and Conservation Loan Program. The Department of Agriculture's Rural Utilities Service will finalize a proposed update to its Energy Efficiency and Conservation Loan Program to provide up to $250 million for rural utilities to finance efficiency investments by businesses and homeowners across rural America. The Department is also streamlining its Rural Energy for America program to provide grants and loan guarantees directly to agricultural producers and rural small businesses for energy efficiency and renewable energy systems.

Farm to Fuel Grants Program. In 2007, the Florida Legislature established the Farm to Fuel Grants Program to provide matching grants for demonstration, commercialization, research and development projects relating to bioenergy. As part of this program, the Legislature appropriated $25 million in matching grants. The program is intended to stimulate investment in energy projects that produce bioenergy from Florida-grown crops, agricultural wastes and residues, and other biomass. In the 25x25 Vision, the State mentioned that "By the year 2015, America's farms, ranches and forests will provide 25 percent of the total energy consumed in the U. S. while continuing to produce safe, abundant and affordable food, feed and fiber". The Florida's Farm to Fuel program continues to be implemented. As a matter of fact the State Energy Office is evaluating proposals they received for the Research and Development Bioenergy Grant Program.

VII. Recommendations

Three components must exist to make the local production of energy crops feasible for County farmers:

1) The cultivation of energy feedstocks must provide a profitable use of agricultural land. The profitability is influenced by processing costs, transportation costs and market demand. Profitability is also influenced by the opportunity cost, the best foregone alternative that could otherwise occur on that agricultural land, which may include cultivation of food crops, cattle grazing, etc.
2) There must be a cost-effective means of processing local agricultural feedstocks. The development of a local biorefinery is a major component of providing a cost-effective means of processing the local feedstocks by reducing transportation costs that can inflate the cost of the end-product.
3) There must be adequate demand for the end-product to keep prices stable.

Conduct Variety Trials: As indicated in the Biomass Section, not all energy crops are suitable to the growing conditions of Miami-Dade County. The County should continue to partner with area universities to conduct additional variety trials to determine which energy crops offer the greatest potential in the County and whether crop adaptations are needed to make it more suitable. In addition to crops, other potential feedstocks should be studied to determine the right place, scale, and application, including an understanding of the current barriers and estimated resource needs.

Inform and Connect Farmers: The Miami-Dade County Agricultural Manager's Office currently partners with area universities to conduct training workshops and field trial days to educate farmers about new crops. Farmers may benefit from similar workshops related to energy crops. Many farmers may be unaware of how to cultivate energy crops and utilize green technology applications. With the assistance of the Agricultural Manager's Office, the County should partner with area universities to develop an outreach campaign to achieve the following:

- inform farmers about new advancements and efforts to develop energy crops that are more resistant to extreme weather conditions and result in higher yields;
- inform farmers about green technology grants or other funding opportunities;
- inform farmers about various types of energy crops and other farm-related feedstocks that are suited to Miami-Dade County including techniques for cultivation and/or processing;
- connect farmers with local processors of energy crops and other farm-related feedstocks;
- inform farmers about the costs and benefits of solar energy as well as possible funding opportunities;
- connect farmers with local utility providers to foster Intercollection Agreements.

Study Biorefinery Development: The development of a local biorefinery is an important step towards making the local production of biomass cost competitive by reducing transportation costs. Currently, the local options for processing agricultural feedstocks are limited. Preliminary

research identified only two biorefineries located in Miami-Dade County for the processing of biomass: GreenBiofuels and GreenStar Biodiesel, both of which process commercial feedstocks such as yellow grease from restaurants and other food service operations. The need for a local biorefinery to process agricultural feedstocks and the need for agricultural feedstocks to drive the demand for a local biorefinery creates a "chicken and egg" situation. The County can play a pivotal role in advancing the development of local renewable energy sources by providing incentives or partnering with the private sector to promote the development of a new biorefinery or modification of an existing biorefinery to provide for the local processing of agricultural feedstocks.

This issue was addressed in a memorandum presented to the Board on July 28, 2009 regarding Biodiesel Production and Use in Miami-Dade County which concluded the following:

> *Biodiesel for commercial consumption must meet established national standards. Consequently, in order to produce quality biodiesel locally, an appropriate feedstock processing (refining) plant has to be designed and adequate quality assurance procedures put in place to meet these standards. Additionally, in order to maximize the local economic impact and to minimize environmental impacts, it is desirable to produce the feedstock (oil seeds, algae, or other sources) locally.*

The study team also looked at the feasibility of developing a biodiesel refinery through a public-private partnership. However a scope of services was never finalized due to the fact the County was unable to identify any suitable county-owned locations at that time.

Incentivize and Utilize Green Energy. Provide incentives for development through one or more of the following methods:

- Partnering with operators on appropriate grant opportunities.
- Supporting legislation and incentives that would facilitate the placement and operation of green energy facilities.
- Partner with area universities to seek funding for further research into the viability of local energy crops.
- Assist with, to the extent possible, County permitting for the installation and/or development of green energy production facilities including bio-fuels.
- Provide appropriate incentives and training for the development of the production of green energy and bio-fuels. Such incentives may include loan funds and tax incentives.
- Create a market for locally produced bio-fuels through consumption by the County.
- Promote the use of local biofuels by County businesses and partners.

Foster the Development of New Green Businesses. Miami-Dade County should continue to market its unique assets such as the abundant natural sunlight and superior infrastructure that make poised to be an incubator for the development of new green ideas. Although many of the case studies presented in this report illustrate the growing pains experienced by companies

attempting to develop new innovations in green technology, each new idea moves green technology forward and puts the County on the forefront of the emerging technology. In addition, the County should pursue grants and other funding opportunities to help promote the development of green businesses.

Support a Renewable Portfolio Standard and Power Purchase Agreements. Florida is now in the minority of states that have yet to pass a Renewable Portfolio Standard. Implementing such a standard and establishing targets would encourage the growth of renewable energy by requiring utilities to generate a certain percentage of their power from renewable sources. The County should continue to urge state legislators to pass a Renewable Portfolio Standard to increase demand for alternative energy. In addition, the County should take actions to urge the Florida Legislature to make distributed solar power more economically feasible for property owners with respect to Power Purchase Agreements or similar third party mechanisms. This would be the single most important issue to be resolve in order to promote wide spread deployment of solar power in our community. Increasing the net metering cap and easing requirements for large net metered projects would also be beneficial.

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[i] National Renewable Energy Laboratory. Solar PV Project Financing: Regulatory and Legislative Challenges for Third-Party PPA System Owners. Technical Report NREL/TP-6A2-46723. Revised February 2010.

[ii] http://www.windpoweringamerica.gov/wind_maps.asp

[iii] California Energy Commission. Developing Methods to Reduce Bird Mortality in the Altamont Pass Wind Resource Area. August 2004.

[iv] http://www.fws.gov/habitatconservation/windpower/Wind_Turbine_Guidelines_Advisory_Committee_Recommendations_Secretary.pdf

[v] http://www.usnews.com/science/articles/2010/12/20/wind-turbines-on-farmland-may-benefit-crops

[vi] http://www.fsec.ucf.edu/en/media/enews/2007/2007-04_Sunshine_state.htm

[vii] Union of Concerned Scientists. Up with the Sun: Solar Energy and Agriculture

[viii] Florida Public Service Commission

[ix] University of Florida/Institute of Food and Agricultural Sciences