1.0 INTRODUCTION AND SUMMARY

1.1 INTRODUCTION

Gainesville Renewable Energy Center, LLC (GREC, LLC) plans to construct, own, and operate a nominal 100-megawatt (MW) net biomass-fired electric generating unit and associated facilities, including state-of-the-art emission control systems. The Gainesville Renewable Energy Center (GREC) will be located on approximately 131 acres of property in northwest Gainesville that GREC LLC will lease from the City of Gainesville (d/b/a Gainesville Regional Utilities [GRU]).

The main GREC plant facilities and systems will include a bubbling fluidized bed (BFB) boiler, conventional steam turbine generator, mechanical draft cooling tower, process and potable water supply systems, wastewater treatment systems (including a zero liquid discharge [ZLD] crystallizer), biomass fuel and byproduct handling and storage systems, BFB boiler air quality control systems, electrical interconnection facilities, and other balance-of-plant systems and equipment. The facilities will include a 230-foot (ft) BFB boiler exhaust stack, natural gas supply for use during BFB boiler startups, emergency generator and firewater pump diesel engines fired with ultra low sulfur diesel (ULSD) fuel oil, ground water supply well system, administration building, and various maintenance and equipment storage warehouses.

The BFB boiler will be capable of accommodating a wide range of clean, woody biomass fuels. GREC will use clean, chipped/ground, woody biomass material as its primary fuel. The biomass will consist of logging residue, mill residue, and urban wood waste. Urban wood waste typically consists of woody tree trimmings created by land clearing, right-of-way maintenance, and other nonforestry sources of woody debris. GREC will use limited quantities of natural gas as fuel during start-up. Emissions from the BFB boiler will be controlled using best available control technologies (BACT). Proposed BACT control technologies include:

- BFB boiler technology to minimize nitrogen oxides (NO_x) production via combustion staging.
- Selective catalytic reduction (SCR) technology to control NO_x emissions.

- BFB boiler technology combined with dry sorbent injection (DSI) and naturally occurring calcium in the wood ash to reduce sulfur dioxide (SO_2), sulfuric acid (H_2SO_4) mist, hydrogen chloride, and hydrogen fluoride emissions.
- Fabric filter baghouse for control of particulate matter (PM).

Operation of GREC will result in airborne emissions. Therefore, a permit is required prior to the beginning of facility construction, per Rule 62-212.300(1)(a), Florida Administrative Code (F.A.C.). This submittal, including the required permit application forms and supporting documentation included in the appendices, constitutes the GREC LLC application for authorization to commence construction in accordance with the Florida Department of Environmental Protection (FDEP) permitting rules contained in Chapter 62-212, F.A.C.

GREC will have potential emissions greater than 100 tons per year (tpy) of a Prevention of Significant Deterioration (PSD) pollutant and is one of the named major stationary source categories (i.e., fossil fuel-fired steam electric plants of more than 250 million British thermal units per hour [MMBtu/hr]) listed in Section 169 of the Clean Air Act (CAA) and Rule 62-210.200(193)(a)1., F.A.C. Accordingly, GREC will be classified as a new *major stationary source* subject to the PSD New Source Review (NSR) requirements of Section 62-212.400, F.A.C., for those pollutants that are emitted at or above the specified PSD significant emission rate levels. Therefore, this report and application is also submitted to satisfy the permitting requirements contained in the FDEP PSD rules and regulations.

This report is organized as follows:

- Section 1.2 provides an overview and summary of the key regulatory determinations.
- Section 2.0 describes the proposed facility and associated air emissions.
- Section 3.0 describes the NSR requirements and discusses applicability of these requirements to the proposed project.

- Section 4.0 describes the applicable state and federal emission standards.
- Section 5.0 provides an analysis of BACT.
- Section 6.0 provides an analysis of maximum achievable control technology (MACT).
- Sections 7.0 (Dispersion Modeling Methodology) and 8.0 (Dispersion Modeling Results) address ambient air quality impacts.
- Section 9.0 discusses current ambient air quality in the vicinity of the project and preconstruction ambient air quality monitoring.
- Section 10.0 addresses other potential air quality impact analyses.
- Section 11.0 provides an assessment of impacts on Class I areas located within 300 kilometers (km) of GREC.

Appendices A and B provide emission rate calculations and the FDEP Application for Air Permit—Long Form, respectively. Appendix C contains the dispersion modeling protocol and agency comments. Appendix D provides the dispersion modeling input and output files for the ambient impact analyses.

1.2 SUMMARY

The primary source of GREC emissions will result from the combustion of biomass fuels in the BFB boiler. Emissions from the main boiler comprise 95 percent of total estimated GREC annual emissions. Principal air contaminants that will be emitted from the BFB boiler stack include NO_x, SO_2, carbon monoxide (CO), volatile organic compounds (VOC), PM/particulate matter less than or equal to 10 micrometers (PM_{10}), hydrogen fluoride, hydrogen chloride, and H_2SO_4. The BFB boiler will also emit trace amounts of metallic and organic compounds. Ancillary GREC emission sources include a mechanical draft cooling tower, emergency generator and firewater pump diesel engines, and material (biomass fuels and byproducts, and DSI sorbent) storage and handling systems.

The planned GREC construction start date is December 2010 with initial operation planned for December 2013.

Based on an evaluation of anticipated worst-case annual operating scenarios, GREC will have the potential to emit 418.1 tpy of NO_x, 715.6 tpy of CO, 130.4 tpy of PM (filterable), 281.2 tpy of PM_{10} (filterable and condensable), 243.9 tpy of SO_2, 78.1 tpy of VOCs, 0.12 tpy of lead, 0.0084 tpy of mercury, and 5.9 tpy of H_2SO_4. Based on these potential annual emission rates, NO_x, CO, PM/PM_{10}, SO_2, and VOC emissions are subject to PSD review.

The analyses required for this permit application have resulted in the following conclusions. Since the primary GREC emission source is the BFB boiler, the conclusions primarily address this emission unit.

- BFB boiler technology and SCR represents BACT for NO_x. The proposed NO_x BACT emission limit for the BFB boiler of 0.07 pound per million British thermal units (lb/MMBtu) (30-day rolling average) reflects the expected performance of the most efficient control technologies available.
- Use of low sulfur biomass fuel, BFB boiler technology, and DSI represents BACT for SO_2. Use of ULSD fuel oil represents SO_2 BACT for the emergency generator and firewater pump diesel engines. The proposed SO_2 BACT emission limit for the BFB boiler of 0.041 lb/MMBtu (30-day rolling average) reflects the expected performance of the most efficient control technologies available.
- Good combustion design and operation represent BACT for CO and VOC. Boiler combustion design and operation requires a balancing of the competing goals to minimize the formation of both NO_x and CO/VOC. The proposed CO BACT emission limit of 0.12 lb/MMBtu (30-day rolling average), and VOC BACT emission limit of 0.013 lb/MMBtu (stack test average) reflect this balance and the aggressive NO_x BACT emission limit proposed for the GREC BFB boiler.
- BFB boiler technology, DSI, and a fabric filter represent BACT for H_2SO_4 mist. The proposed H_2SO_4 mist BACT emission limit for the BFB boiler of 0.0010 lb/MMBtu (stack test average) reflects the expected performance of

the most efficient control technologies available and stack test method constraints.

- A fabric filter (i.e., baghouse) represents BACT for filterable PM/PM_{10}. The proposed filterable PM/PM_{10} BACT emission limit of 0.015 (stack test average) reflects the expected performance of the most efficient control technology available. Water suppression, enclosure, and fabric filter technology will be used to control PM/PM_{10} emission from the material handling, processing, and storage activities. The mechanical draft cooling tower will employ high efficiency drift eliminators to achieve a drift loss rate of no more than 0.0005 percent of the cooling tower recirculating water flow.
- With the exception of PM_{10}, the ambient impact analysis demonstrates that GREC impacts will be below the PSD Class II significant impact levels (SILs) defined in Rule 62-210.200(281), F.A.C. Accordingly, a multisource cumulative assessment of national ambient air quality standards (NAAQS) attainment and PSD Class II increment consumption was only required for PM_{10}. The cumulative modeling analysis demonstrates that GREC and offsite emission source total PM_{10} impacts will be below the NAAQS and PSD Class II increments.
- GREC is projected to emit NO_x, PM_{10}, SO_2, CO, and VOC in greater than significant amounts. The ambient impact analysis demonstrates that GREC impacts will be below the PSD *de minimis* monitoring significance levels for all of these pollutants with the exception of PM_{10}. Accordingly, GREC qualifies for the Rule 62-212.400(3)(e), F.A.C., exemption from PSD preconstruction ambient air quality monitoring requirements for all PSD pollutants except for PM_{10}. Current (2004 through 2008) quality-assured ambient air data collected at a nearby FDEP PM_{10} monitoring site located 4.5 miles south of GREC was used to satisfy the PSD preconstruction ambient air monitoring requirements for PM_{10}.
- Class I areas located within 300 km of GREC include the Okefenokee and Wolf Island National Wilderness Areas (NWAs) in Georgia and the Bradwell Bay, St. Marks, and Chassahowitzka NWAs in Florida. Application of

the Federal Land Manager Air Quality Related Values Workgroup (FLAG) initial screening criteria demonstrates that GREC will not have any adverse impact on air quality-related values (AQRVs) at each of these PSD Class I areas.

- The ambient impact analysis demonstrates that GREC impacts will be below the U.S. Environmental Protection Agency (EPA) proposed PSD Class I SILs for all PSD pollutants and averaging period for the Class I areas evaluated. Accordingly, a multisource cumulative assessment of PSD Class I increment consumption was not required.
- Based on refined dispersion modeling, GREC will not cause, nor contribute to, an exceedance of any NAAQS, Florida ambient air quality standards (AAQS), or PSD increment for Class I or Class II areas.