

Waste Not, Get Watts: Waste-to-Energy and Gas-to-Energy Systems

Comparison

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Florida Institute of Technology

**ENGINEERING & SCIENCE
STUDENT DESIGN SHOWCASE**

FLORIDA TECH

Introduction:

Waste-to-Energy (WtE) systems generate power by converting waste into usable energy through processes such as combustion and gasification, reducing reliance on landfills and recovering energy from discarded materials.¹ Gas-to-Energy (GtE) systems produce electricity from natural gas using high-efficiency generation technologies like gas turbines and combined-cycle plants, offering reliable and efficient power output.² This comparison evaluates the feasibility and scalability of WtE and GtE systems for Florida Tech, determining which approach would better meet campus energy needs while supporting long-term sustainability goals.

Objectives:

- Compare the environmental impacts of WtE and GtE systems locally to determine which system best supports Florida Tech’s sustainability goals.
- Evaluate the feasibility and scalability of each system for Florida Tech.

Methods:

- Conducted site visits to WtE and GtE facilities, including travel to locations, photographic documentation, operational tours, and discussions with facility staff to understand system design, efficiency, and environmental controls.
- Consult with regional experts through discussions with representatives from the City of Melbourne, the Florida Department of Environmental Protection, and South Broward County Resource Recovery to gather operational and policy insights.

Results:

Figures 1 and 2 below illustrate the geographic locations of the Waste-to-Energy (WtE) and Energy (GtE) facilities evaluated in this study. Shows proximity to Florida Tech which provides spatial context for accessibility and potential integration into local systems.

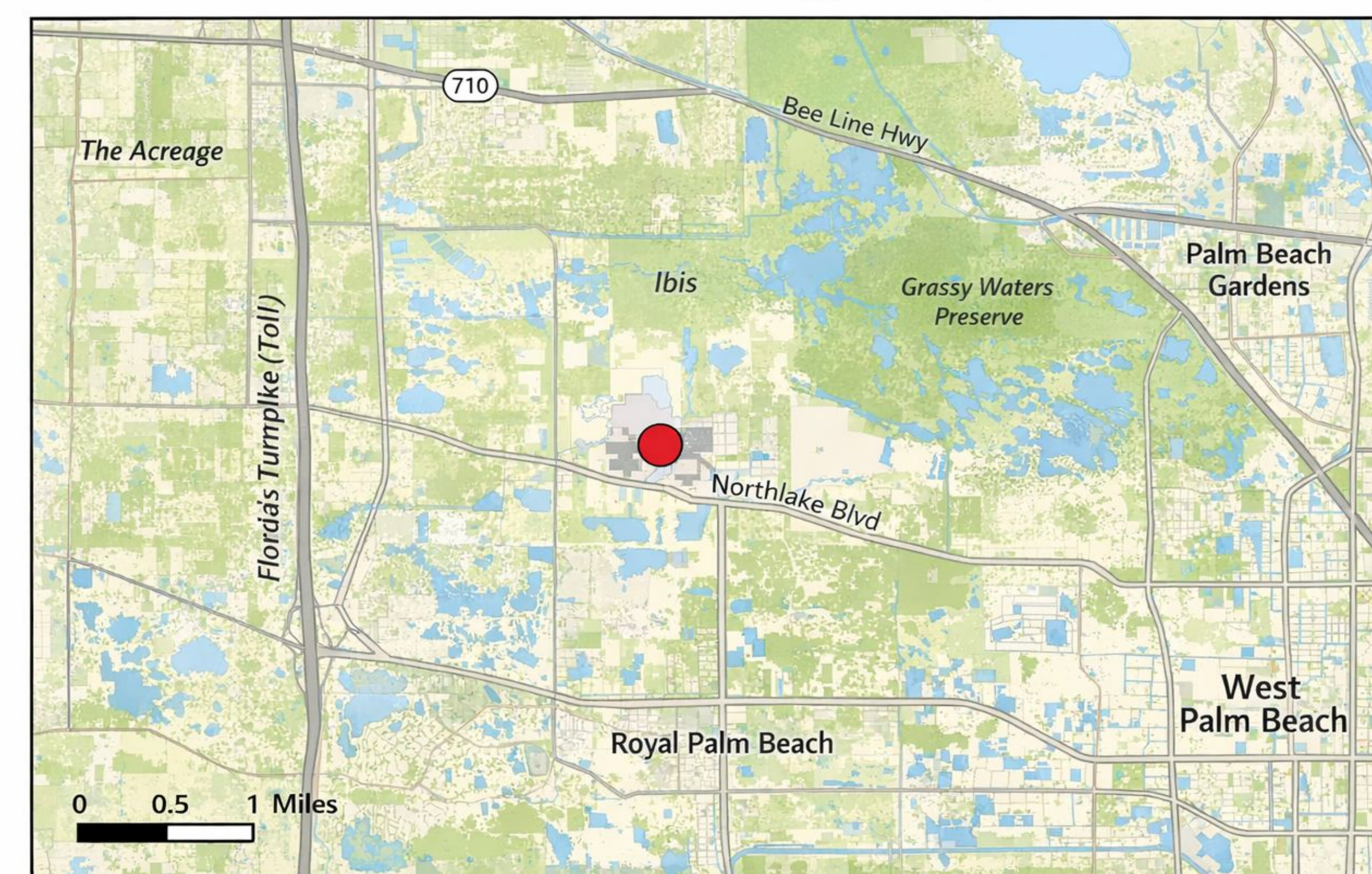


Figure 1. Location Diagram WtE Facility

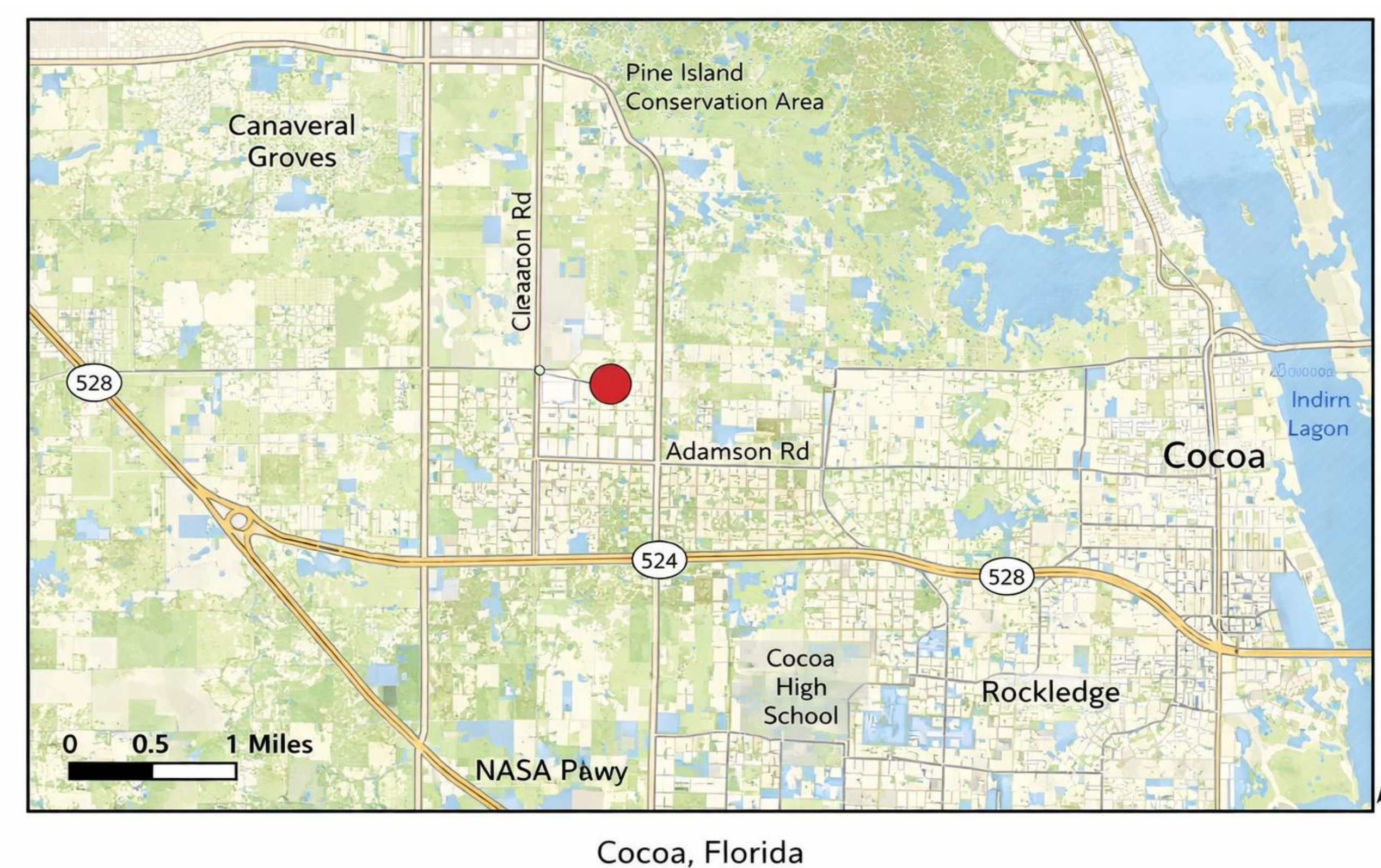


Figure 2. Location Diagram GtE Facility

Figure 3. WtE and GtE Table

Results (cont.):

On-campus resource generation points (i.e., “fuel sites”) that serve as potential feedstock sources for energy production systems at Florida Tech.



Figure 4. Collection Sites of On-Campus “Fuel”

Conclusion:

In comparing Waste-to-Energy (WtE) and Gas-to-Energy (GtE) for the Florida Institute of Technology, GtE is the more practical and scalable option due to existing infrastructure, regional support, and lower logistical complexity. While WtE aligns well with campus waste streams—especially organic and cardboard waste from dining facilities—it introduces challenges with odor, storage, and transport efficiency, as waste must accumulate before being moved off-site, creating potential “smelly” conditions and scheduling inefficiencies. Additionally, WtE would require new infrastructure, permitting timelines extending into the 2030s, and greater operational management. In contrast, GtE benefits from established systems in Brevard County, supported by legislation and implemented through private entities like Brevard Energy LLC under a DBBOOM model, eliminating major capital and operational costs for the university. Although both systems require off-site processing and transportation of fuel, gas can be delivered continuously via pipelines, making it more reliable

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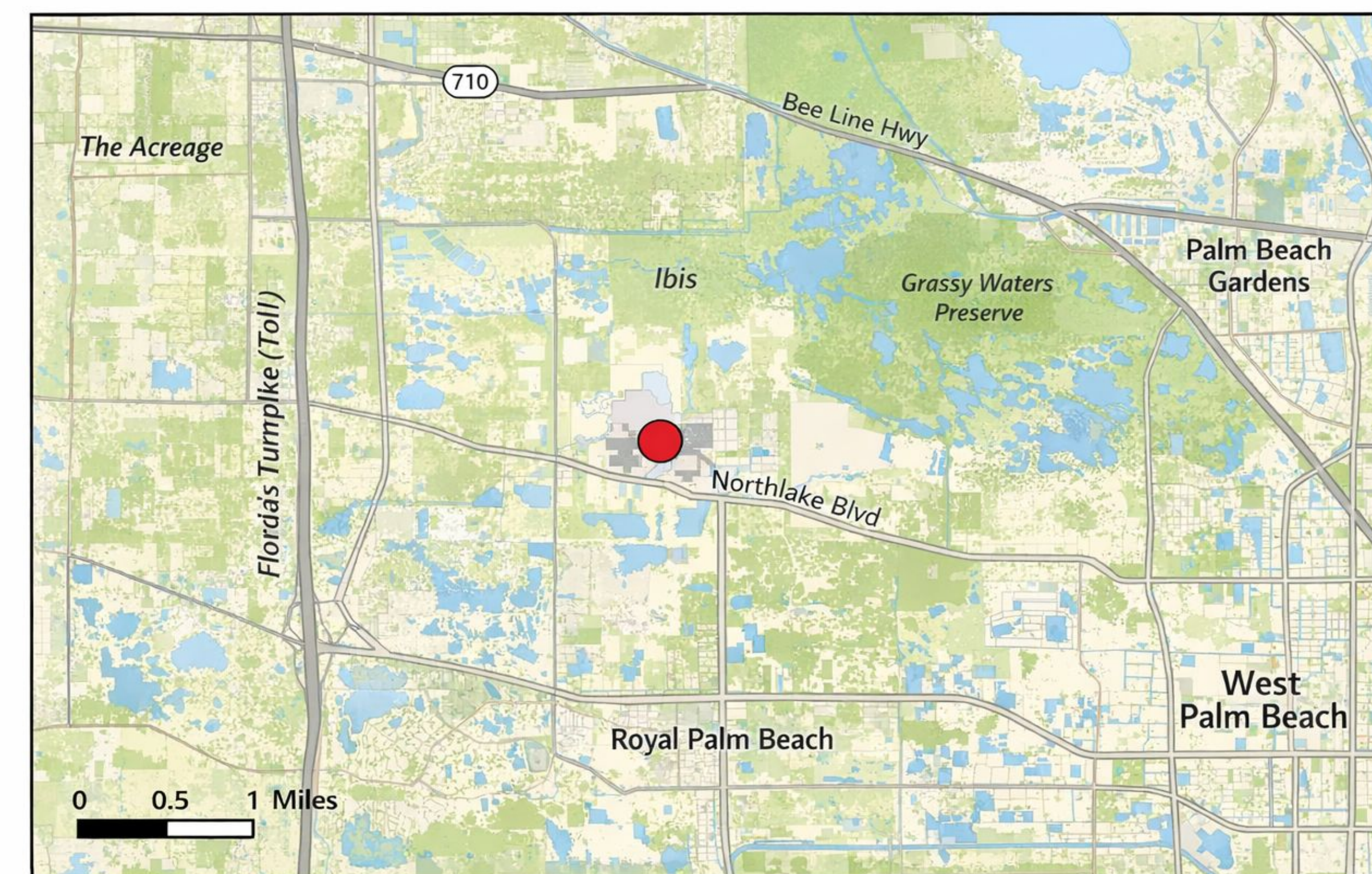


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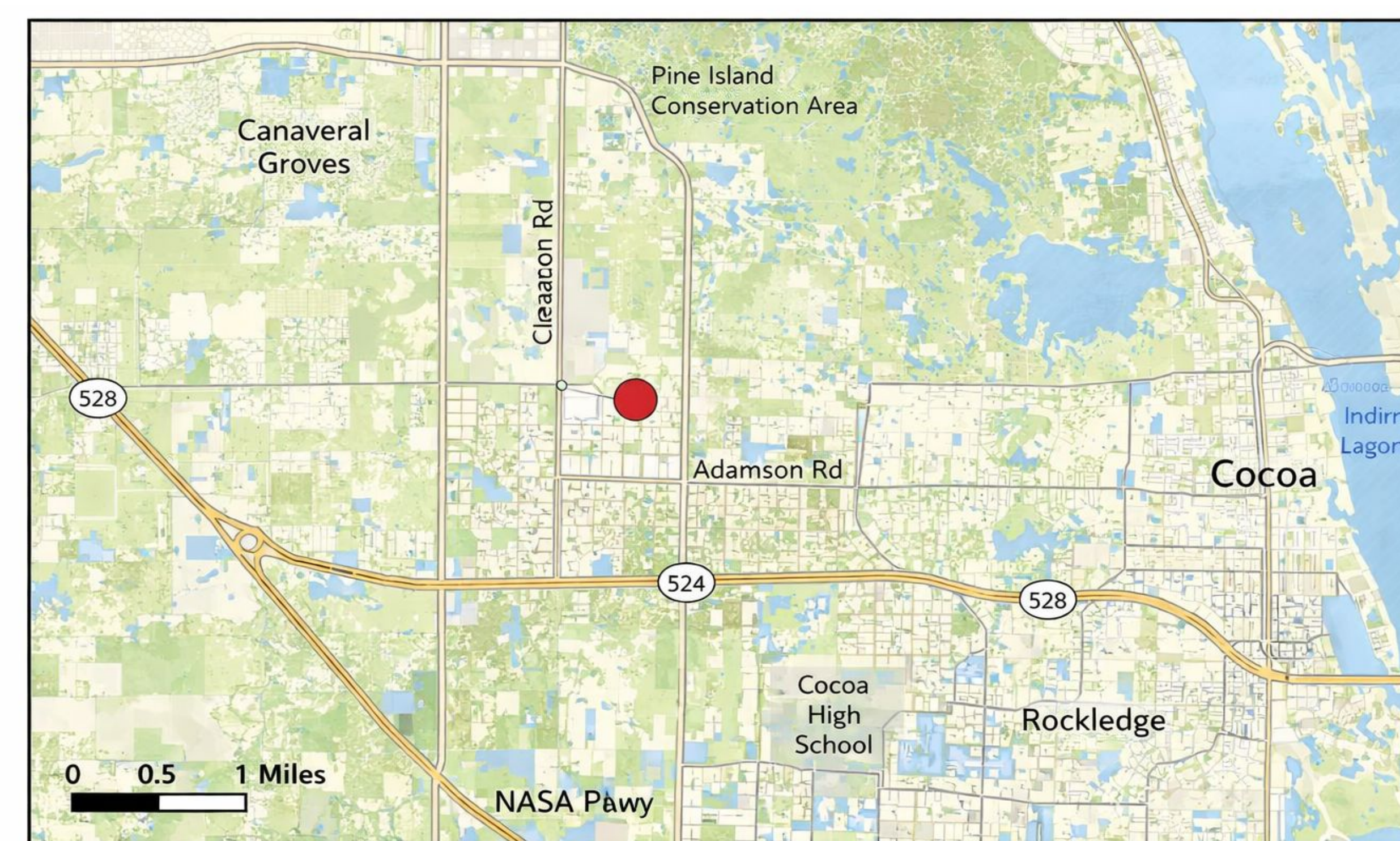


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References:

- ¹ OAS, Limits and Potential of Waste-to-Energy
 - ² arXiv (2018), Natural Gas Power Generation and Energy System Performance
 - ² arXiv (2018), Natural Gas Power Generation and Energy System Performance
- [2] https://floridadep.gov/sites/default/files/WTE_Contacts_2020.pdf

