

Florida Solid Waste Management: State of the State

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ABSTRACT

The proposed research entails conducting an economic assessment of the available strategies and technologies for solid waste management in Florida, along with an evaluation of the environmental footprints of these approaches. The researchers will compile available data on local solid waste tax assessments (or other revenue sources), facility tipping fees, and hauling costs; estimate the current material flow for the Florida solid waste stream; and develop a database of current and historic waste commodity prices. A stakeholder working group will be created as a component of this project with the goal of discussing current issues related to the economics of waste management options in Florida over the next decade.

The research team will use the data compiled from the study along with currently available lifecycle assessment and emissions modeling tools to examine the economic and environmental costs of different solid waste management strategies specific to Florida. A whitepaper entitled *Florida Solid Waste Management: State of the State* will be produced and will provide a concise summary of the compiled data, the results of the economic and environmental waste management evaluations, and the findings and discussions of the working group. The results of this research will provide a resource for future decision-making at the local, regional and state-wide level, providing practitioners a tool to make better informed decisions on waste management approaches moving forward.

PRINCIPAL INVESTIGATOR

The investigator for the proposed research is Timothy Townsend, a Professor in the Department of Environmental Engineering at the University of Florida.

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Dr. Townsend's area of specialization is solid and hazardous waste management and engineering. Dr. Townsend has been researching and teaching in the discipline of solid and hazardous waste management since 1990. He teaches engineering courses on solid and hazardous waste management, landfill design, recycling and beneficial use of waste materials to both undergraduate and graduate students. His research areas include sustainable landfill design and operation, landfill leachate and gas management, construction and demolition debris, electronic waste, waste leaching, recycling of waste materials, and waste management in developing countries.

MOTIVATION AND PROJECT JUSTIFICATION

A number of issues contribute to the uncertainty currently experienced by many in Florida's solid waste industry.

- Market values for recyclable commodities are lower than they have been in years.
- Recovered material purchasers (e.g., paper mills) are demanding higher quality product while at the same time product quality from many materials recovery facilities (MRF) has declined with the predominance of single stream programs.
- The waste stream has evolved (e.g., less newspaper, more composite packaging).
- More efficient collection vehicles and strategies have implemented or contemplated.
- Waste management technologies that were historically never considered feasible are actively being pursued (gasification in St Lucie County, mixed waste processing in Escambia County, anaerobic digestion of segregated organics at Reedy Creek Improvement District).
- Statutory, regulatory, and policy requirements drive additional recycling or landfill diversion (e.g., Florida 75% recycling goal; required C&D recycling where economically feasible).
- Landfill costs remain low.

The uncertainty felt by the solid waste community is evidenced by many of the 2016 Hinkley Center research agenda items (#s 1, 4, 7, 12, 19, 25, 26), all of which relate (at least in part) to solid waste economics and making appropriate decisions for future management practices. The aims of the proposed research are (1) to compile current data on the state of solid waste management in Florida (with a particular focus on costs), (2) to discuss the implications of these data in a workshop setting with a diverse mix of stakeholders, and (3) to produce a document that will help solid waste decision makers in Florida make clear and informed choices. The relevant steps in the waste management process and the relation to the research agenda are conceptually illustrated in Figure 1.

TOPIC BACKGROUND

As new methods for the management of solid wastes are developed and refined, questions are often posed about the economic and environmental merits of these strategies. For example, in recent years, technologies such as mixed waste processing, anaerobic digestion, and waste gasification have all been proposed as viable waste management processes for Florida municipalities looking at alternatives to conventional solid waste management practices. Yet at the same time, the drop in current recycled commodity prices have posed problems for existing operations. A recent trend in the US solid waste industry has been the closing of single stream recycling facilities that are no longer economically viable; more stringent quality requirements pose challenges for marketing recovered materials from single stream systems. Some recovered materials, such as glass and C&D debris, are inherently low in market value. The waste stream is also changing, with a growing trend of using plastic or composite films for packaging instead of more traditional materials (glass, metal, rigid plastic)

Economic data on different solid waste management systems/processes are often surprisingly difficult to come by. In some cases, this results from the proprietary nature or limited application of a technology, while in other cases, relevant data are buried as part of more complex cost estimates. Economic data do exist, but effort is needed to collect, decipher, and summarize these data in a form that would be of general use to the Florida solid waste management community.

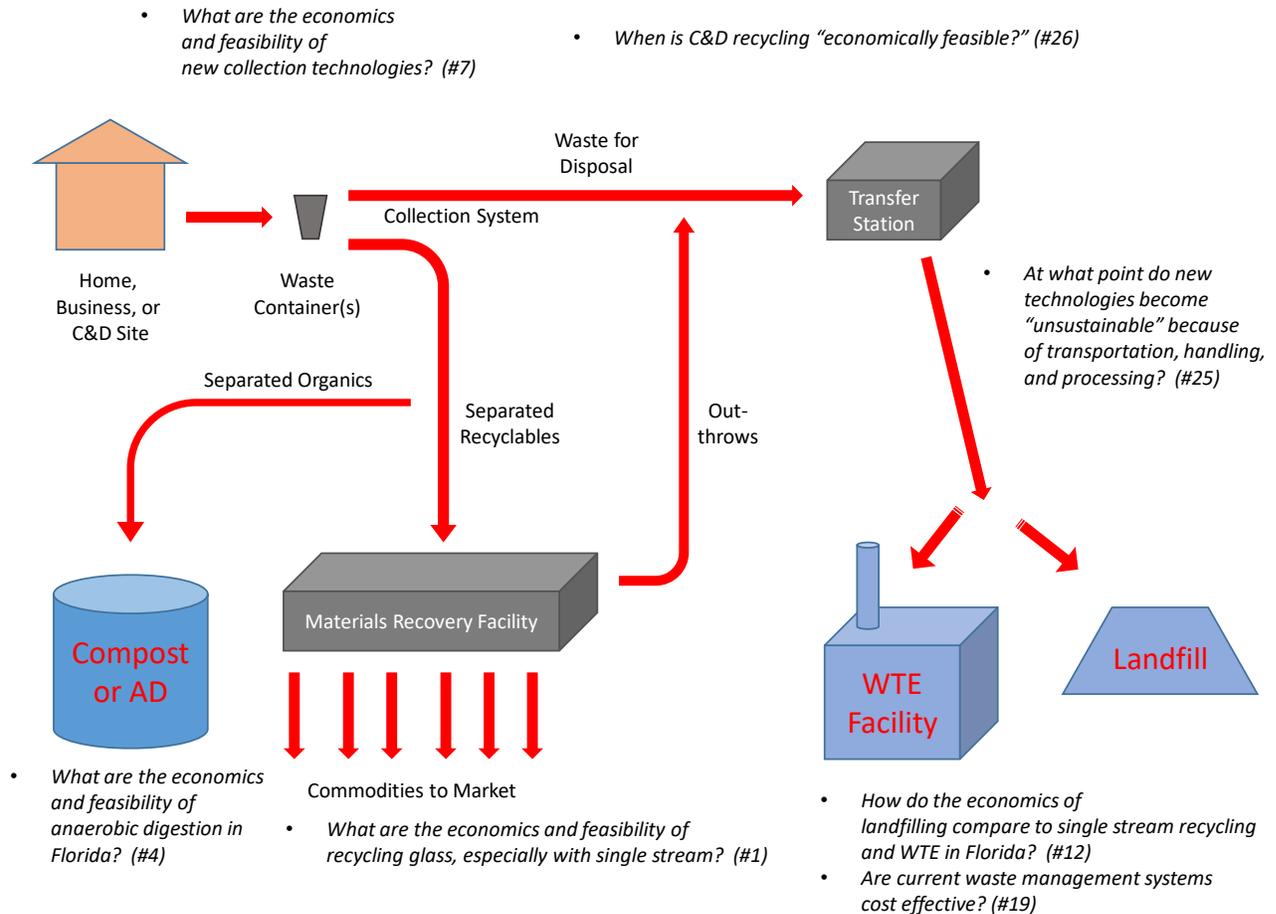


Figure 1. Conceptual illustration of the economic/feasibility topics in needs of exploring per the 2016 Hinkley Center Research Agenda

While cost continues to be the primary driver for solid waste management decisions, other factors are more frequently being included when evaluating management system performance and choice. For example, examination of the environmental footprint (e.g., carbon footprint) associated with a system or technology, may result in a difference preference than based on just cost alone. As an example, consider the case of a mixed waste processing facility couple with a “one-bin” system. More equipment and energy are used to recover recyclables from a unit mass of solid waste, but more recyclables are subject to recovery from the waste stream and less collection vehicles (and miles traveled) are required.

Tools are now available to aid in solid waste management decision making. Some of these include both life cycle assessment (LCA) evaluation as well as economics (US EPA’s decision support tool (DST), while others focus on energy and greenhouse gas (GHG) emissions (US EPA’s Waste Reduction Model; WARM). These tools, however, are only as accurate as the data provided.

OBJECTIVES

The specific objectives of this research project are as follows:

- Form a state-wide stakeholder working group to participate in a dialogue on the state of solid waste management in Florida.

- Compile cost data from Florida municipalities including county tax assessments (or other residential funding mechanisms), facility tipping fees, and contracted collection costs.
- Estimate materials flow and composition for the Florida solid waste stream.
- Create a database of current and historic commodities pricing for recyclables.
- Develop a series of specific waste management options (for actual Florida conditions) and conduct an economic and environmental assessment for different waste management technologies using the collected data and existing LCA-type tools.
- Evaluate the economic viability feasibility of CDD recycling, as well as emerging waste management technologies, for different Florida regions.
- Develop a summary document that outlines the findings of the stakeholder working group and provides a concise publically available source of cost and environmental data on Florida's solid waste management practices.

METHODOLOGY AND SCIENTIFIC APPROACH

The approach that will be used in this research relies heavily on the participation of the knowledgeable professionals connected to solid waste management in Florida. The PI has had previous success with forming similar professional stakeholder groups (the Hinkley Center project on limitations to recycling combustion residuals in Florida). The PI and his students will facilitate an interaction among professional, gather needed data, provide analysis of this data in form that is meaningful to the working group, and develop a document that will be of benefit for developing future solid waste management strategies in the state.

Specific project methodology tasks are identified as follows:

Task 1. Establish Stakeholder Working Group.

Members of the Florida solid waste community will be invited to participate in a working group to discuss the state of solid waste management in Florida. Representatives from the public sector (municipal government, regulatory agencies, and environmental groups) and private sector (facility owner/operators, haulers, technology representatives, end-users) will be included. After a preliminary data gathering period (see later tasks), a project kickoff meeting will be held and ideas for additional data gathering will be solicited. A second meeting will focus on a presentation and discussion of the data and on the development of specific evaluation scenarios. A third meeting will be held to discuss the results of the scenario evaluations and to discuss a draft of the project summary document (whitepaper). Multiple iterations of the document will be provided to the working group for review and comment. A final wrap-up meeting will be held via conference call.

Task 2. Compile Available Data on Florida Solid Waste Management Economics.

The research team, with support from the working group, will gather data from Florida municipalities related to Florida solid waste management economics. The following information will be gathered (additional data may be identified by the working group).

- Municipal solid waste assessments (or utility rates)
- Landfill tipping fees
- MRF processing fees and contracted revenue split

- Historic recycled commodity prices (Figure 2 presents an example of the type of data that will be compiled and used as part of this analysis)
- Contracted residential hauling costs
- Statewide waste generation, composition and disposition
- Other facility processing/tipping fees

This information will be gathered by contacting solid waste directors or other appropriate representatives in each municipality. Some of this data will also be collected from the facilities or from the FDEP reported data. Some information needed may not be available on a Florida-specific basis (e.g., anaerobic digestion, gasification, source-segregated organics (SSO) collection). Data from other municipalities/technologies in the US or internationally will be collected as needed. Limitations of all data will be identified. The author has visited several of these facilities and has developed a network of connections and resources that will be useful in this project (e.g., see Figures 3 through 6).

Task 3. Develop Waste Economic and Environmental Scenario Evaluations.

With the working group's feedback, the research team will identify a number of specific regions and corresponding waste management scenarios. For example, an existing municipality's collection and disposal system might be used as a base-case scenario, and the data gathered in Task 2 will be used to assess alternative approaches (collection, processing, and disposal). Scenarios of specific evaluation will include (but are not limited to):

- Implementation of SSO collection and composting or AD.
- Implementation of a one-bin system with a mixed waste processing facility.
- Removal of glass from a municipal waste recycling system.
- C&D recycling in areas of different generation, material market demand, and disposal fee structure.

In addition to economics, tools such as DST and WARM will be used to evaluate other issues such as energy consumption/generation and GHG emissions. Figure 7 provides an example of a WARM model example performed on different waste management scenarios for a hypothetical community with results presented as greenhouse gas emissions.

Task 4. Summary Document on *The State of Florida State Solid Waste Management.*

The research team along with the stakeholder working group members will develop a whitepaper on the state of solid waste management in Florida. Included in the whitepaper will be data that were compiled as a part of Task 2 and the scenario evaluations developed in Task 3. The whitepaper will also reflect the recommendations and dialogue generated by the working group over the course of its meetings.

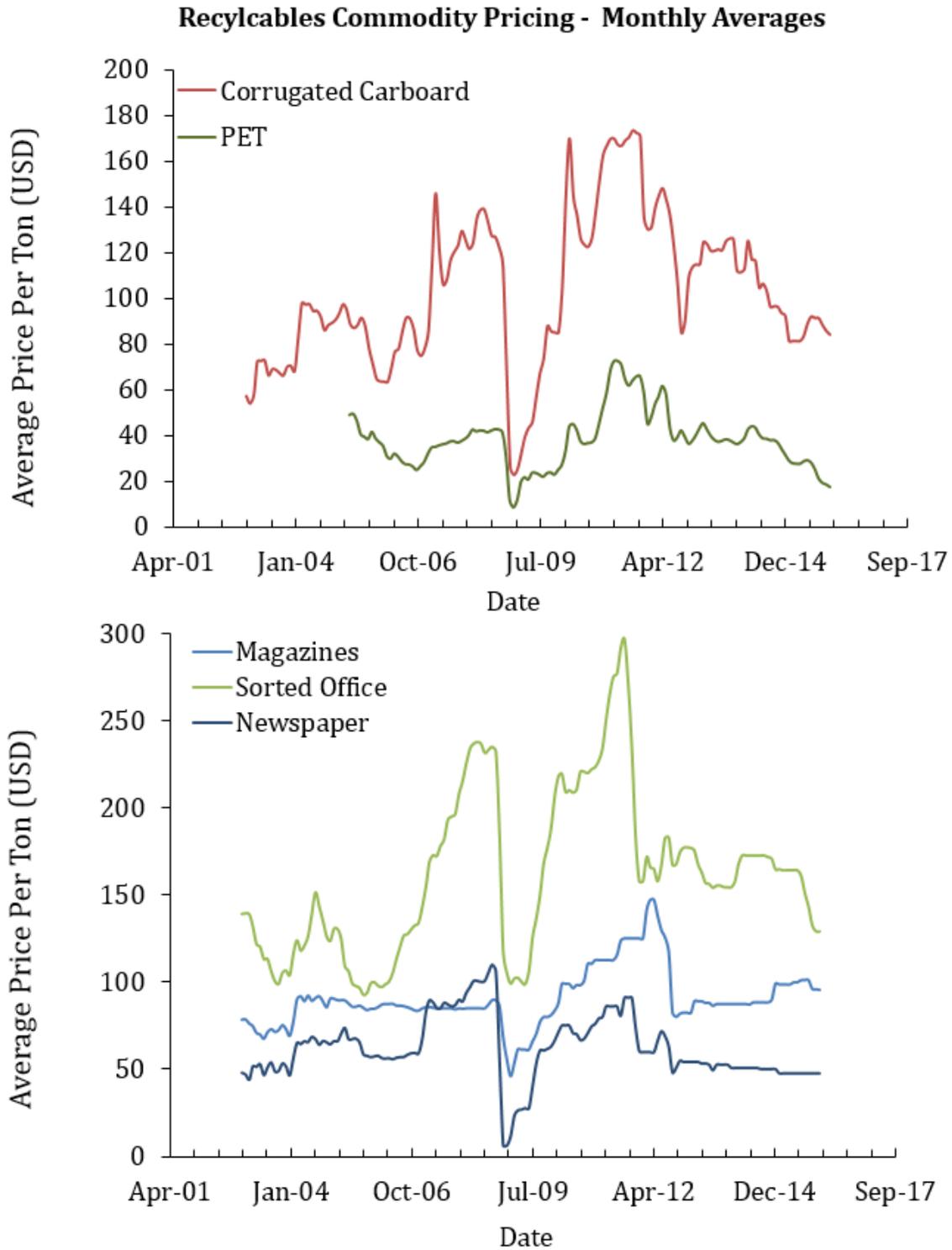


Figure 2. Market Prices for Selected Commodities in US



Figure 3. Low Solids Anaerobic Digestion System for SSO in Toronto, Canada



Figure 4. High Solids Anaerobic Digestions System for SSO in San Jose, CA



Figure 5. Mixed Waste Processing Facility in Santa Clara, CA



Figure 6. Aerobic Composting for Organics from Mixed Waste System in Gilroy, CA

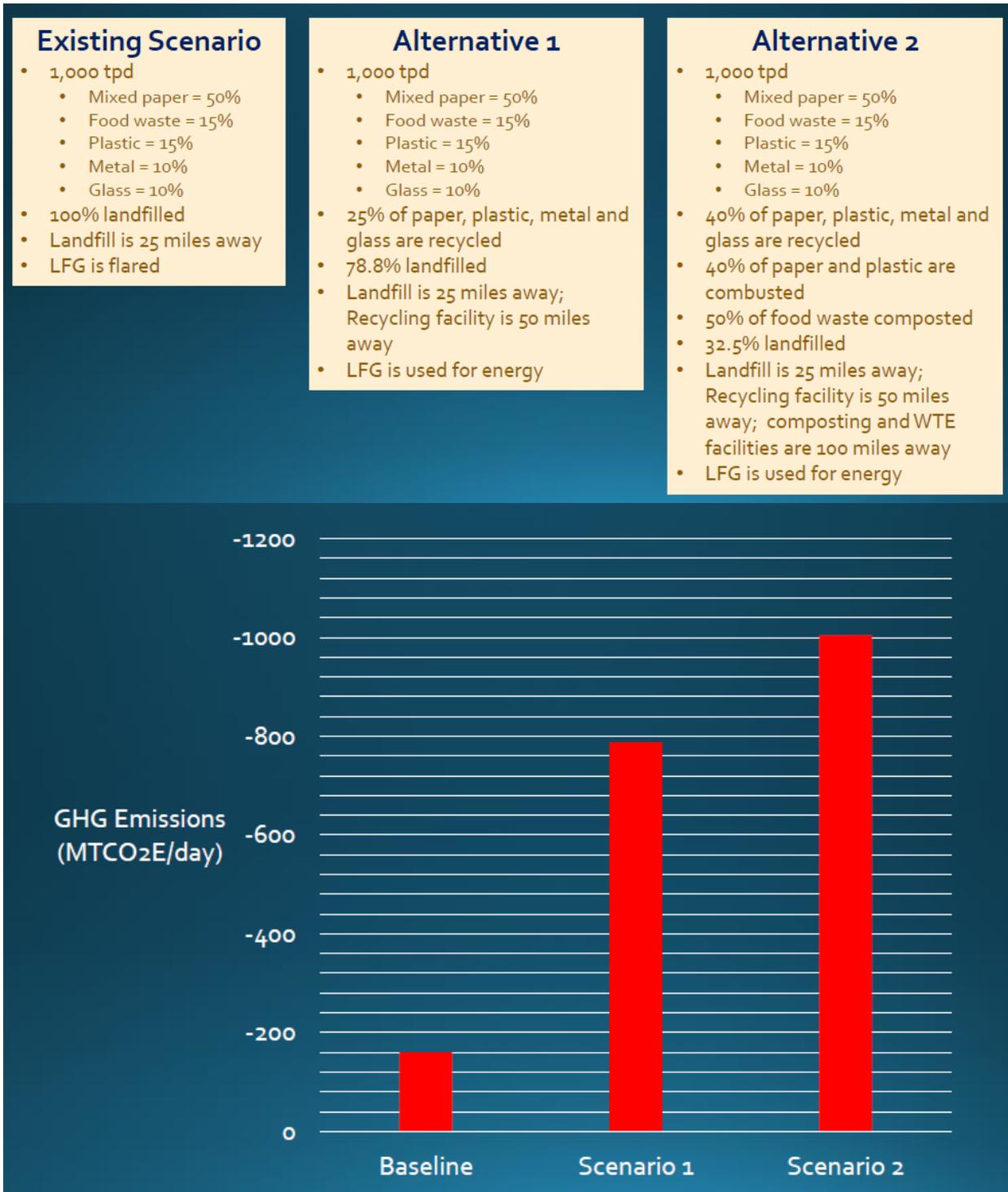


Figure 7. Example WARM Evaluation for a Hypothetical 1,000 tpd MSW Stream. In the “existing” scenario, 100% of the waste is landfilled. In alternative 1, recycling is included and the landfill gas is recovered for energy. In alternative 2, recycling is increased, composting of food waste is included, and some of the materials are combusted for energy. The results show an increasing reduction in greenhouse gas emissions (more negative MTCO₂E) with each alternative.

DELIVERABLES

Deliverables for the proposed work include progress reports to the Center, the preparation of a final technical report (presented in the form of the whitepaper), and any manuscripts or thesis chapters completed by students working on this project as part of their degree requirements. All other deliverables required by the Center will be met. A project website will be maintained, an information dissemination plan will be developed, and other necessary deliverables will be completed.

TIMELINE

A 12-month project is proposed with the following timeline:

Task	1	2	3	4	5	6	7	8	9	10	11	12
Task 1. Establish Stakeholder Working Group.	X											
Task 2. Compile Available Data on Florida Solid Waste Management Economics.			X	X	X	X	X					
Task 3. Develop Waste Economic and Environmental Models.						X	X	X	X	X		
Task 4. Co-Author a Whitepaper on The State of Florida State Solid Waste Management.										X	X	X
TAG Meeting		X				X				X		

BENEFITS

The solid waste community in Florida will benefit from better science regarding the current state of the practice of solid waste management in Florida. This information will allow solid waste practitioners to have a tool to use during decision making related to future solid waste management options. The compiled economic data will provide a resource for the public sector in Florida that they often may not have access to.

STAKEHOLDER WORKING GROUP

One of the critical components of this research project is forming a stakeholder working group related to the discussion of solid waste management practices in Florida. This working group will serve as a forum for discussion and will help to identify unanswered questions which could serve as areas for future research and development. In addition, the solid waste director in each County will be contacted regarding the availability of data and the opportunity to provide matching support for additional students; such support could be used to conduct municipality-specific scenario evaluations of interest to the municipality.

PLAN FOR SEEKING OTHER SOURCES OF FUNDING

Results of the project will be communicated to members of the solid waste community through two face-to-face project technical awareness group meetings. Quarterly project reports will be submitted to the Hinkley Center with updates on the project status. These reports will also be posted the project website along with routine updates on project results. A final report will be produced and disseminated to the project TAG as well as posted on the Hinkley Center and UF project websites.