# QUARTERLY PROGRESS REPORT

October 1, 2018 to December 31, 2018

**PROJECT TITLE:** Looking Beyond Florida's 75% Recycling Goal: Development of a Methodology and Tool for Assessing Sustainable Materials Management Recycling Rates in Florida

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**COMPLETION DATE: September 30, 2019** **PHONE NUMBER: 352-392-0846**

**PROJECT WEB SITE: http://pages.ees.ufl.edu/townsend/research/hc18/**

**Work accomplished during this reporting period:**

*Lifecycle Assessment Model Data Collection and Analysis*

For this reporting period the research team reviewed pertinent literature, including the International Standard 14040 which described the principles and framework for lifecycle assessment (LCA). Furthermore, we gained access to relevant models and completed required usage training.

As per ISO 14040 standards, a lifecycle assessment has four phases: 1) goal and scope definition; 2) inventory analysis; 3) impact assessment; and 4) interpretation. Goal and scope is where the functional unit (e.g., a ton of mixed MSW), your type of system and its boundaries are defined. Inventory analysis is where the large databases are stored that contain information related to the system and any process or flows included in the system. Impact assessment is where the data in the inventory analysis and assumptions/equations are used to estimate and quantify impacts. And interpretation is where the results from the inventory analysis and impact assessment are combined in the form of a conclusion and/or recommendation to decision-makers.

The research team gained access to the following LCA models during this period: Waste Reduction Model (WARM), OpenLCA, Municipal Solid Waste Decision Support Tool (MSW-DST), and Environmental Assessment System for Environmental Technologies (EASETECH). WARM, MSW-DST, and EASETECH were developed as an end-of-life-specific LCA model, where their input parameters incorporate solid waste generation, composition, and management practices (e.g., recycling, landfilling). While, OpenLCA is a more flexible LCA model that may include solid waste specific LCA and/or other product LCA, such as cotton production, depending on the database chosen to be imported into OpenLCA. Both WARM and MSW-DST were developed by the United States (US) Environmental Protection Agency (EPA), while EASETECH was developed by the Technical University of Denmark. Thus, WARM and MSW-

DST output results based on typical US end-of-life operations and EASETECH outputs results based on European or Danish end-of-life operations.

WARM is most different to the other models because it does not directly follow the ISO 14040 standards, instead it uses various lifecycle inventory databases (that comply with ISO 14040 standards) to calculate the greenhouse gas (GHG) emissions and energy use associated with one ton of material and its end-of-life management practice. OpenLCA, MSW-DST, and EASETECH calculate GHG emissions and resource use (i.e., energy and water use), as well as many other lifecycle impact categories such as eutrophication potential or acidification potential. These models comply with ISO 14040 standards, whereby they calculate the impact associated with one ton of a materials and its end-of-life management using their own lifecycle inventory database. We will continue to evaluate the use of these models and collect more available data/literature specific to our research scope.

**Work planned for the next reporting period:**

*Development of Lifecycle Impact Assessment Factors*

The project team will use the four LCA models collected as part of Task 1, to assess each model's ability to provide us with lifecycle impact assessment (LCIA) factors, such as GHG emissions or water use, associated with one ton of a material and its end-of-life management. The models provide results associated with environmental impacts (expect MSW-DST does include cost impacts). We will use these models to calculate the following environmental LCIA factors: energy use, GHG emissions, water consumption, and toxicity. Other LCIA factors that are not included in the traditional LCA models, such as economic costs, landfill disposal capacity, recycled materials marketability, and jobs produced will be calculated for each material and its management using collected solid waste industry data.

*Preparation for first Stakeholder Working Group Meeting*

The project team will hold a meeting during the next reporting period with solid waste industry representatives to present the data that we have collected so far, explain our proposed project approach, and to receive their input.

**Metrics:**

| Name | Rank | Department | Professor | Institution |
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| Malak Anshassi | PhD Student | Environmental Engineering | Dr. Townsend | University of Florida |