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2021 SMM Tool Walkthrough & Application

June 24th, 2021
University of Florida

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Florida Department of Environmental Protection

Hinkley Center for Solid and Hazardous Waste Management

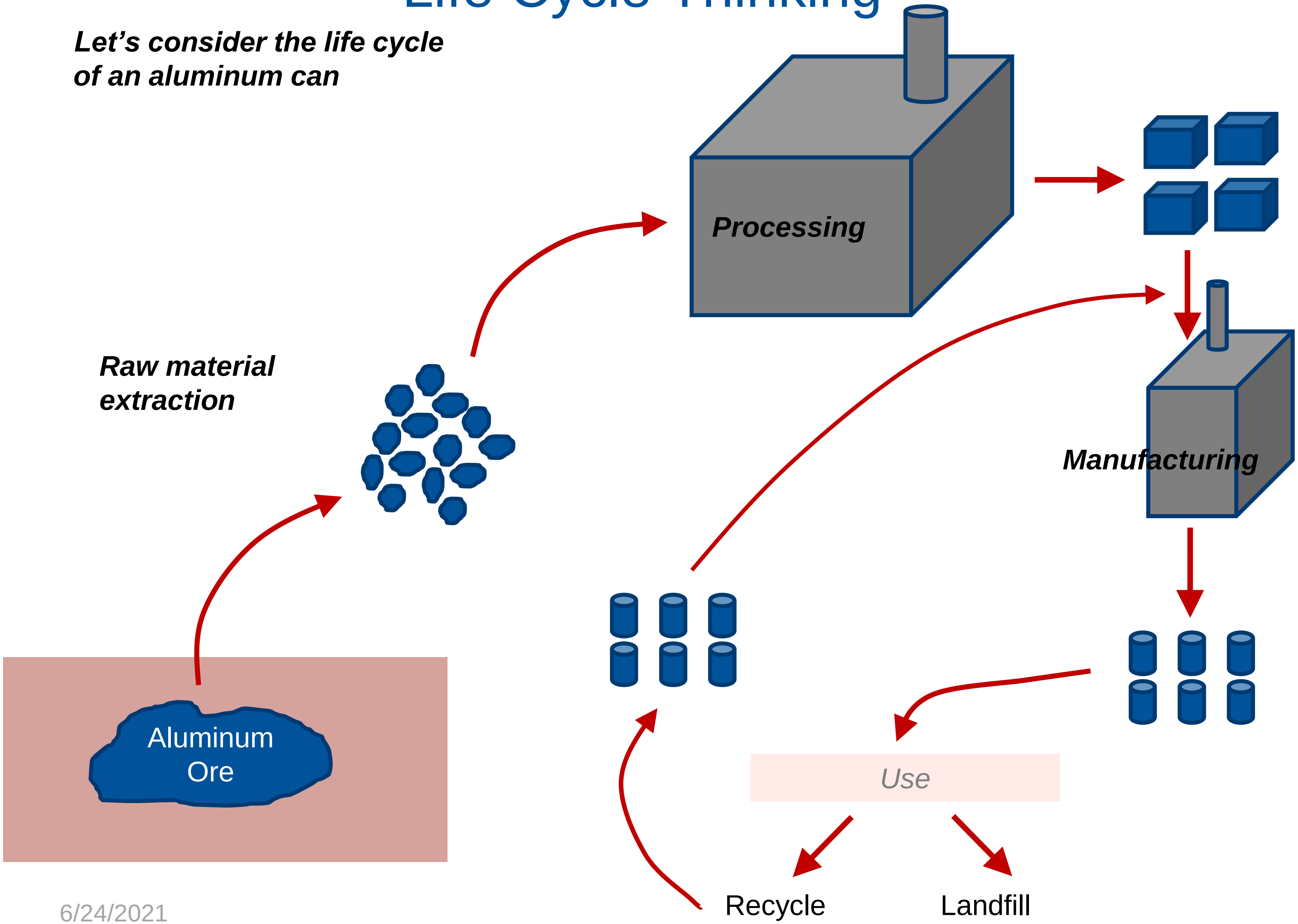
Sustainable Materials Management

"Sustainable materials management (**SMM**) is a systemic approach to using and reusing materials more productively over their entire **life cycles**. It seeks to **use materials in the most productive way** with an emphasis on using less. "

https://www.epa.gov/smm/sustainable-materials-management-basics

Life Cycle Thinking

Let's consider the life cycle of an aluminum can



Life Cycle Thinking Application

Answer Questions Like…

Prioritize and Strategically Plan

- Which materials should we prioritize recycling?
- Which disposal method is best for our waste stream?
- Which policies or technologies should we prioritize?
- Which stakeholders should we prioritize?

AND

Performance Metrics

- What should our targets metrics be based on?
- What are the units of measure our metrics should be?
- How can we measure our solid waste system performance?

Life Cycle Assessment (LCA)

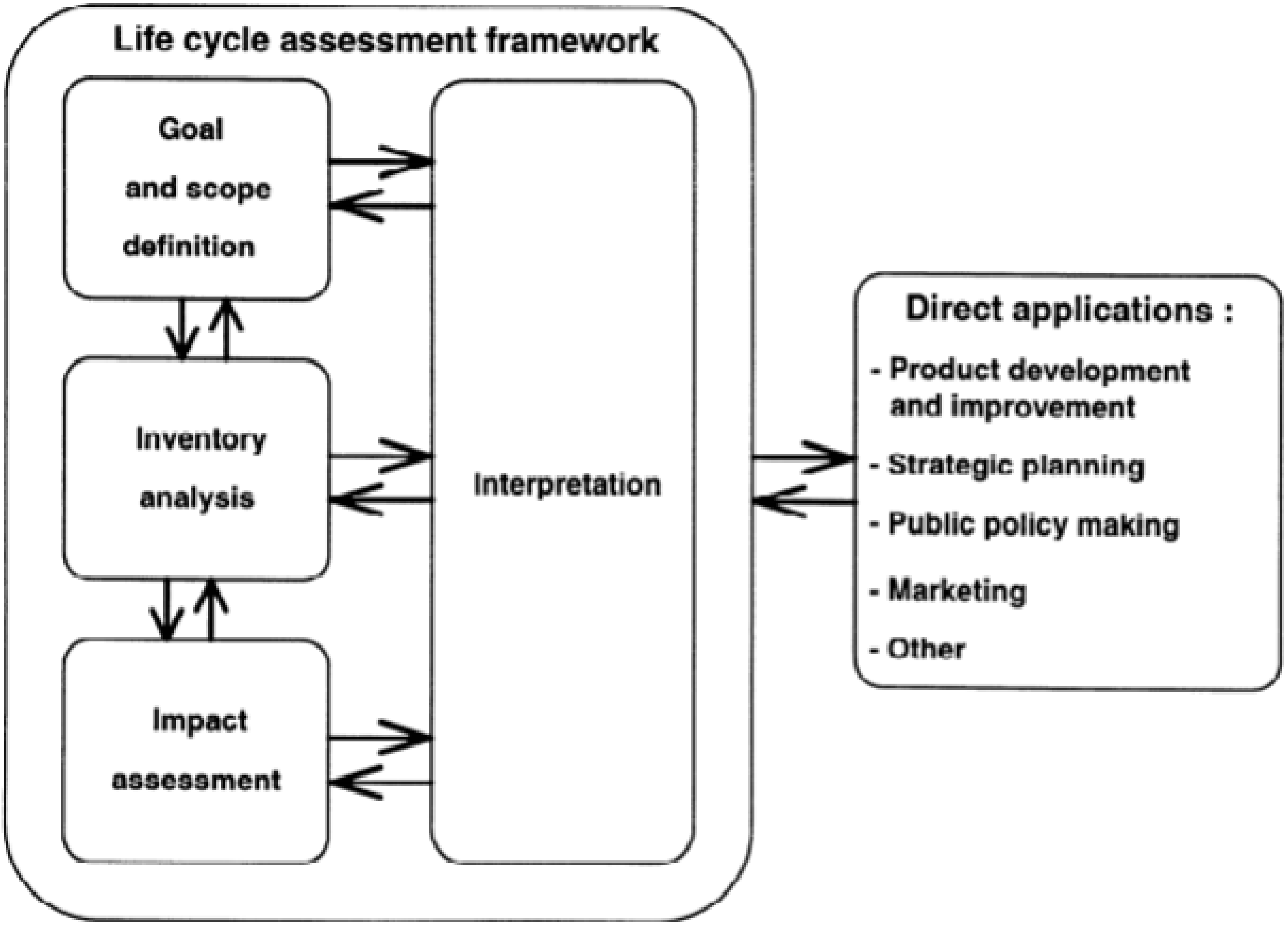
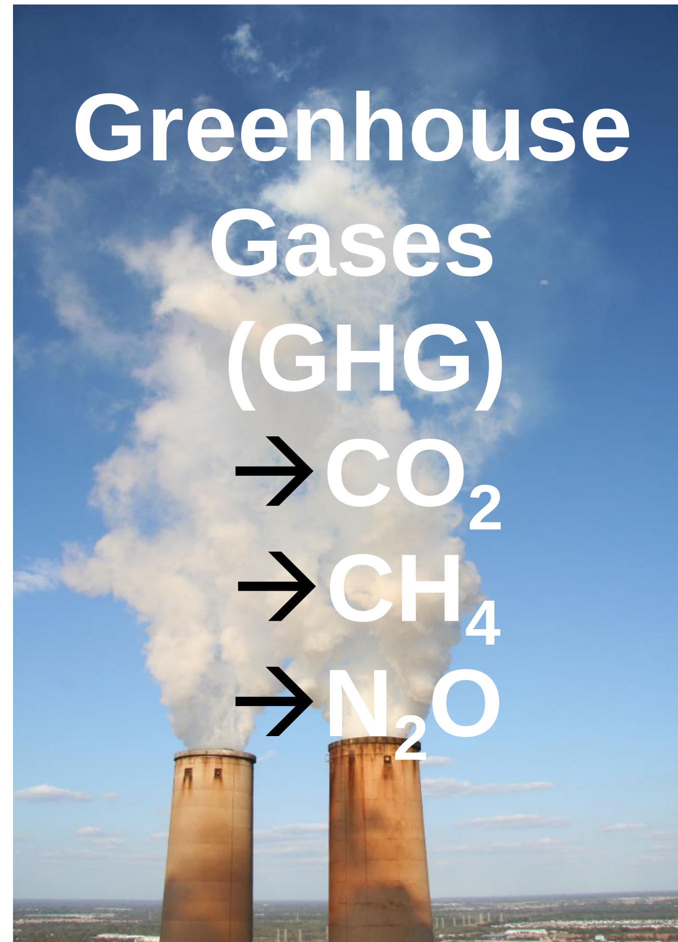


Figure 1 : Phases of an LCA

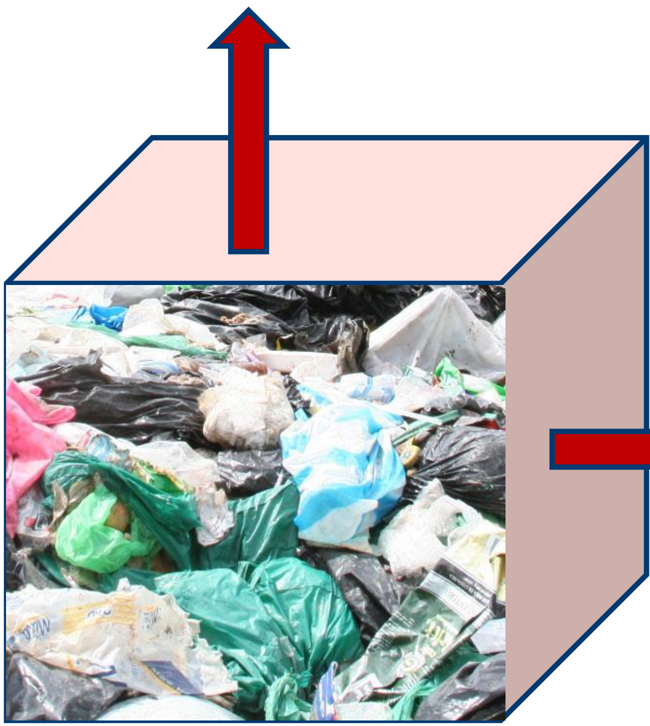
https://web.stanford.edu/class/cee214/Readings/ISOLCA.pdf

LCA Indicators



Impact Factors

Net CO_2, CH_4, N_2O, … → Metric Tons of CO_2 Equivalents ($tCO_2eq.$)



Mass of Waste

$$\frac{tCO_2eq.}{Ton\ Waste\ Managed}$$

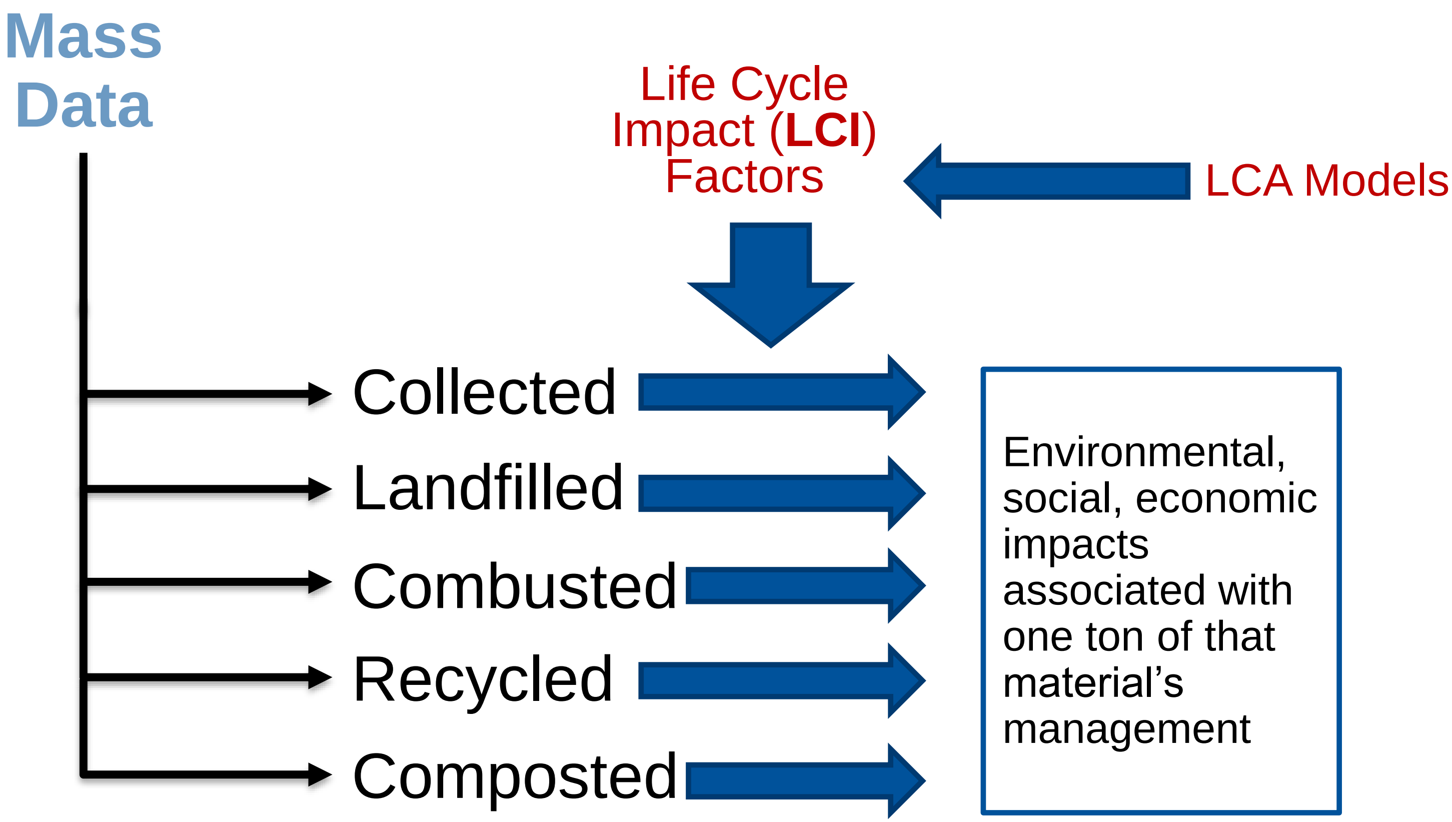
Impact Factors Calculations

$$\text{Net GHG Emissions (per ton)} = [\text{GHG Emissions}] - \begin{bmatrix}\text{GHG Emissions} \\ \text{Offsets}\end{bmatrix}$$

Degradation of biogenic carbon containing waste fractions

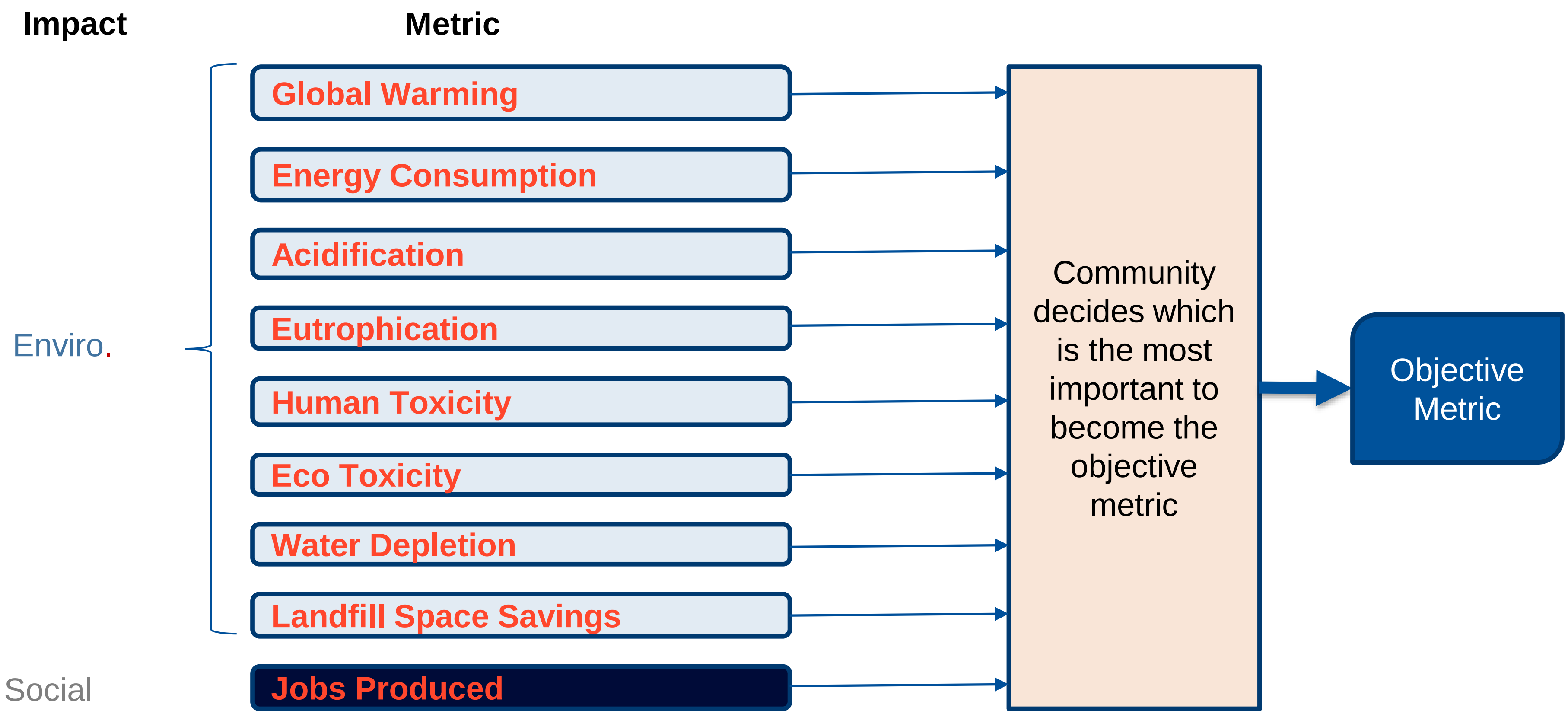
- Electrical power offset
- Remanufacturing
- Carbon sequestration and storage

Workbook-Based Life Cycle Assessment (LCA) Tool



Source: https://faculty.eng.ufl.edu/timothy-townsend/research/florida-solid-waste-issues/looking-beyond-floridas-75-recycling-goal/

Methods of Obtaining Environmental-Based LCI Factors



HC18/19 Workbook Tool

Workbook Tool Introduction Screen for Users

lorida's 75% Recycling Goal: Development of a Methodology and Tool for Assessing Sustainable Materials Management Recycling Rates in Florida

Welcome to the Hinkley Center for Solid and Hazardous Waste Management Funded SMM Workbook Tool!

This tool is an outcome of the Hinkley Center funded project titled, "Looking beyond Florida's 75% Recycling Goal: Development of a Methodology and Tool for Assessing Sustainable Materials Management Recycling Rates in Florida". In a previous Hinkley Center project titled, "Florida Solid Waste Management: State of the State", researchers from the University of Florida estimated the material mass flow for the Florida solid wase stream and conducted a comprehensive analysis on the economic costs and environmental footprints associated with the 2016 waste stream. The researchers also conducted an evaluation of alternative waste management strategies upon the recycling rate, economic costs, and environmental footprint. The alternative waste management strategies were based on the concept of sustainable materials management (SMM). SMM originated in a 2002 EPA publication entitled "Beyond RCRA: Waste and Materials Management in the Year 2020." In 2009, EPA further developed the idea in "Sustainable Materials Management: The Road Ahead," which presented a roadmap for moving toward SMM. In these and other documents, SMM is characterized as a varying set of resource-efficient actions to be taken across the entire lifecycle of a material or product — from extraction through refinement, manufacturing, assembly, distribution, use, and end-of-life management. SMM, then, focuses on identifying best material management practices based on environmental, economic, and social impacts. Lifecycle assessment (LCA) models are tools that measure those impacts, and policymakers use LCA results to make SMM-informed decisions. In effort to continue this research, University of Florida researchers evaluated various US-developed LCA models and literature to create lifecycle impact (LCI) factors that can be used to measure the impacts of a community's waste management practices as part of the "Looking beyond Florida's 75% Recycling Goal: Development of a Methodology and Tool for Assessing Sustainable Materials Management Recycling Rates in Florida" project.

To read more on the scope of this project and documentation of this tool please visit:
https://www.essie.ufl.edu/home/townsend/research/florida-solid-waste-issues/hc18/

To read more about the previous project please visit:
https://www.essie.ufl.edu/home/townsend/research/florida-solid-waste-issues/hc16/

This workbook tool provides local government and other users the opportunity to measure the impacts of their solid waste management practices. Below is a description of the components of this workbook tool.

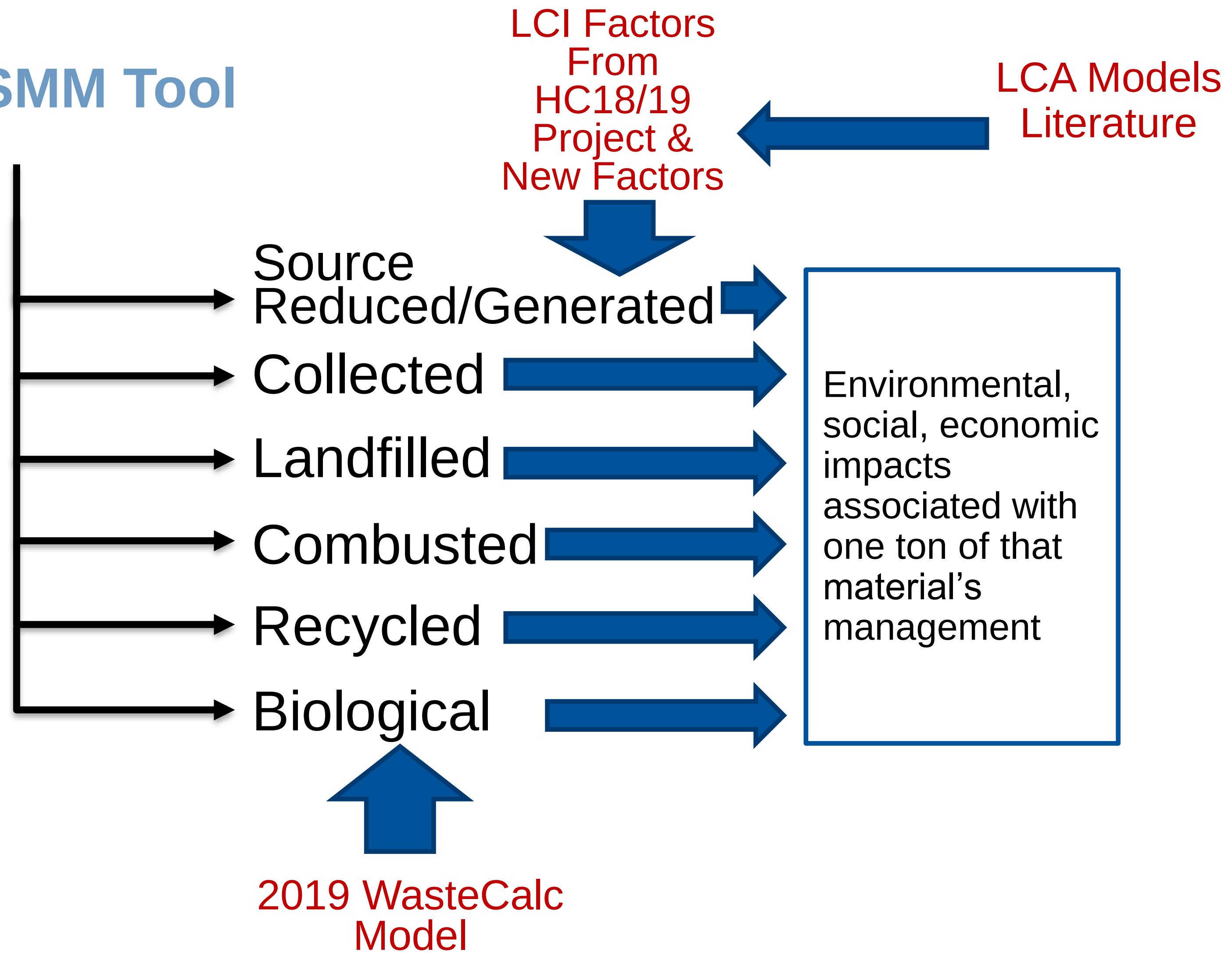
Tab No.	Tab Title	Tab Description
1	User Input	User must complete Steps 1 and 2. Step 1 permits the user to select from seven models, which are used to estimate LCI factors. The LCI factors are specifically associated with each model. In Step 2 the user must enter the

Introduction | 1-User Input | 2-Summary LCA Output | 3-Clim. Chan. (tCO2eq per Ton) | 4-Energy ...

Source: https://faculty.eng.ufl.edu/timothy-townsend/research/florida-solid-waste-issues/looking-beyond-floridas-75-recycling-goal/

Incorporate SMM Using Metrics

2021 SMM Tool



Source: https://faculty.eng.ufl.edu/timothy-townsend/research/florida-solid-waste-issues/tool-to-track-progress-toward-smm-goals/

Refinements to the 2019 WasteCalc Model

Input

Recycled Tons	
Newspaper	Ferrous Metals
Glass	White Goods
Aluminum Cans	Non Ferrous Metals
Plastic Bottles	Other Paper
Steel Cans	Textiles
Corrugated Boxes	C&D Debris
Office Paper	Food Waste
Yard Trash	Miscellaneous
Other Plastics	Tires

Landfilled Tons

Combusted Tons

Collected C&D Tons

Behind the Scenes

Recent US EPA data

WasteCalc

Recent FL waste composition data

Output

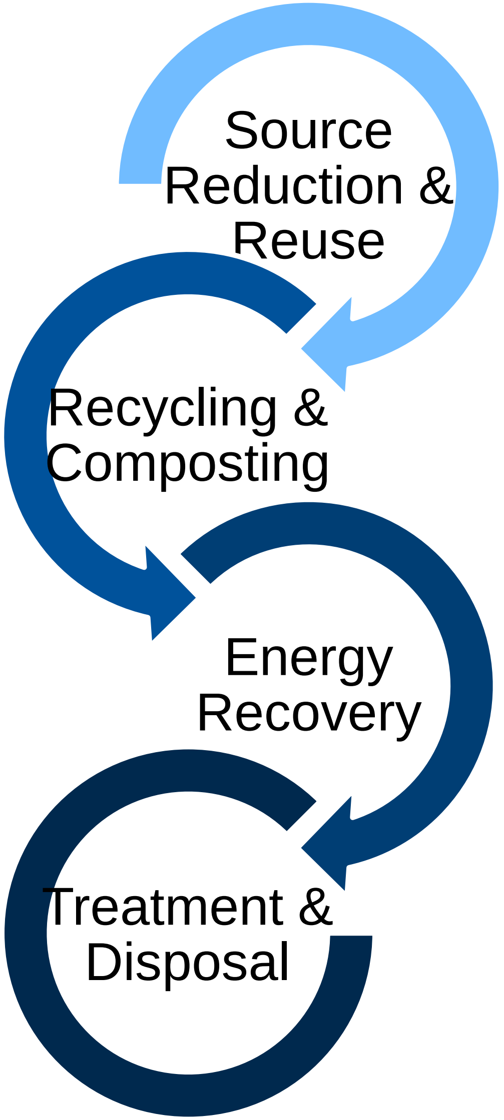
% MSW Composition	Tons MSW Composition
Newspaper	Newspaper
Glass	Glass
Aluminum Cans	Aluminum Cans
Plastic Bottles	Plastic Bottles
Steel Cans	Steel Cans
Corrugated Boxes	Corrugated Boxes
Office Paper	Office Paper
Yard Trash	Yard Trash
Other Plastics	Other Plastics
Ferrous Metals	Ferrous Metals
White Goods	White Goods
Non Ferrous Metals	Non Ferrous Metals
Other Paper	Other Paper
Textiles	Textiles
C&D Debris	C&D Debris
Food Waste	Food Waste
Miscellaneous	Miscellaneous
Tires	Tires

New Input Options

New Outputs

Integrate Source Reduction Activities

- **Measure the mass of materials consumed for in previous years and compare to recent years**
- **Donation is a form of source reduction since materials are directly reused**
  - **Map the donation flow of materials**



New Material Categories

Based on FDEP 18 categories and 2019 WasteCalc Estimates

Original FDEP Categories	New Categories
Newspaper	
Glass	
Aluminum Cans	
Plastic Bottles	HDPE and PET
Steel Cans	
Corrugated Boxes	
Office Paper	
Yard Trash	
Other Plastics	Mixed plastics
Ferrous Metals	Mixed metals
White Goods	Electronics
Non Ferrous Metals	Mixed metals
Other Paper	Mixed paper, magazines/third-class mail, and books
Textiles	Clothing and footwear
C&D Debris	Wood products, asphalt shingles, gypsum drywall, concrete, asphalt pavement
Food Waste	
Miscellaneous	Mixed MSW, electronics, and furniture
Tires	
Process Fuel	

2021 SMM Tool Walkthrough

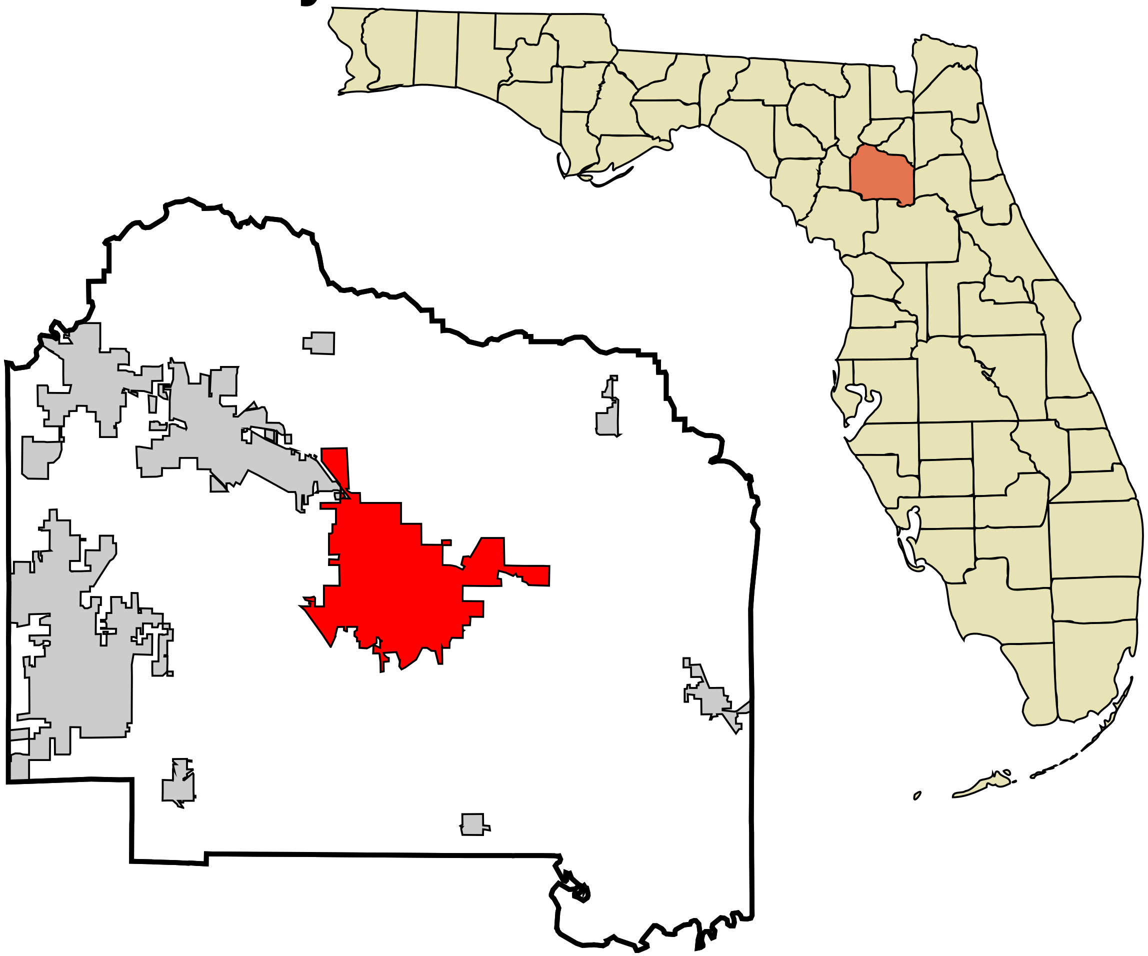
Focused for Recycling Coordinators

2021 SMM Tool Walkthrough

Focused for Decision Makers

Decision Making Application

What is the waste management environmental footprint of Alachua county?



Decision Making Application

What is the waste management environmental footprint of Alachua county?

Summary Output: All output units are in parenthesis next to the table label and LCI factor category name. A negative value indicates a savings (or avoidance) of emissions/resources use.

Output data:

Table 1.

Climate Change ($tCO_2eq.$): Greenhouse gases (GHG) absorb energy and slow energy from escaping into space which causes the Earth to get warmer. GHG are expressed as units of $tCO_2eq.$of material to allow for comparison of global warming impacts of different gases relative to CO_2. This is a measure of how much energy the emission of 1 ton of gas will absorb over a given period of time, relative to the emissions of 1 ton of CO_2.

Material Category	Item No.	Material Type	Source Reduced/ Generated	Donated	Produced	Collection	Recycling	Composting	Anaerobic Digestion	Landfill	Combustion	Lifecycle Total	Waste Management Total
MSW	1	Mixed MSW	-	-	-	156	-	-	-	7,150	-	7,306	7,306
Paper	2	Newspaper	(38,370)	-	19,089	11	(8,251)	-	-	(270)	-	(27,792)	(8,511)
	3	Corrugated Cardboard (OCC)	(55,589)	-	318,467	129	(85,882)	-	-	(592)	-	176,533	(86,345)
	4	High Grade Paper (Office Type Paper)	(4,283)	-	32,660	13	(7,618)	-	-	1,001	-	21,774	(6,603)
	5	Magazines/third-class mail	12,151	-	80,898	30	(699)	-	-	(4,474)	-	87,906	(5,143)
	6	Books	1,111	-	8,332	3	(54)	-	-	592	-	9,984	541
	7	Mixed Paper	34,032	-	225,812	97	(2,277)	-	-	(4,032)	-	253,631	(6,212)
Plastic	8	HDPE	559	-	1,998	4	(344)	-	-	16	-	2,233	(324)
	9	PET	1,341	-	4,792	7	(761)	-	-	26	-	5,403	(729)
	10	Mixed Plastic	(5,838)	-	44,029	75	(998)	-	-	369	-	37,637	(554)
Glass	11	Glass	(351)	-	4,286	23	(1,138)	-	-	51	-	2,872	(1,063)
Metals	12	Aluminum Cans	373	-	11,371	3	(3,771)	-	-	11	-	7,987	(3,757)
	13	Steel/Tin Cans	415	-	4,687	4	(613)	-	-	16	-	4,510	(593)
	14	Mixed Metals	6,165	-	111,881	59	(67,529)	-	-	45	-	50,620	(67,426)
Organic	15	Yard Waste	-	-	-	472	-	(7,155)	-	(387)	(15,418)	(22,488)	(22,488)
	16	Food Waste	8,434	(2,562)	98,365	88	-	(112)	-	10,395	-	114,608	10,372
Other	17	Tires	10,684	-	12,163	9	(775)	-	-	12	-	22,093	(754)
	18	Clothing and Footwear	-	-	-	30	(8,645)	-	-	83	-	(8,532)	(8,532)
	19	Furniture	-	-	-	4	-	-	-	-	-	4	4
	20	Electronics	65,085	(5,571)	91,632	16	(1,925)	-	-	37	-	149,275	(1,871)
C&D Debris	21	Wood Products	42,640	-	98,862	152	(62,413)	-	-	(21,804)	-	57,437	(84,065)
	22	Asphalt Shingles	3,135	-	7,269	126	(1,839)	-	-	314	-	9,005	(1,399)
	23	Gypsum Drywall	1,909	-	4,426	67	242	-	-	(640)	-	6,004	(331)
	24	Concrete	7,390	-	17,134	211	(399)	-	-	489	-	24,825	301
	25	Reclaimed Asphalt Pavement	1,012	-	2,347	69	(1,161)	-	-	125	-	2,394	(966)
Total			92,004	(8,133)	1,200,500	1,862	(256,851)	(7,266)	-	(11,468)	(15,418)	995,229	(289,142)

Table 2.

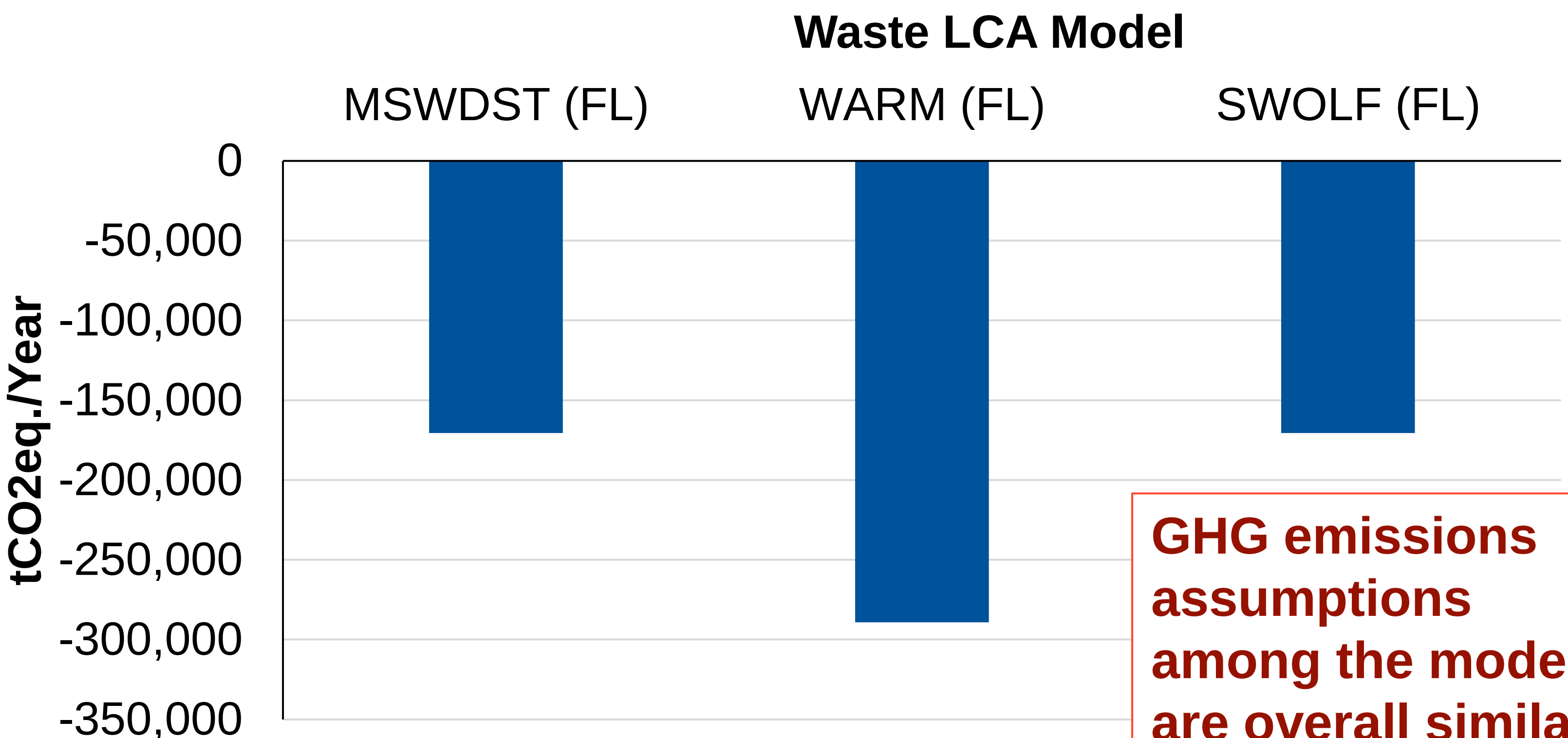
... 4 SMM Input | 5 SMM Results | 6 LCI Factors

But what are the results when using other models?

Decision Making Application

What is the waste management environmental footprint of Alachua county?

GHG Emissions Waste Management Footprint

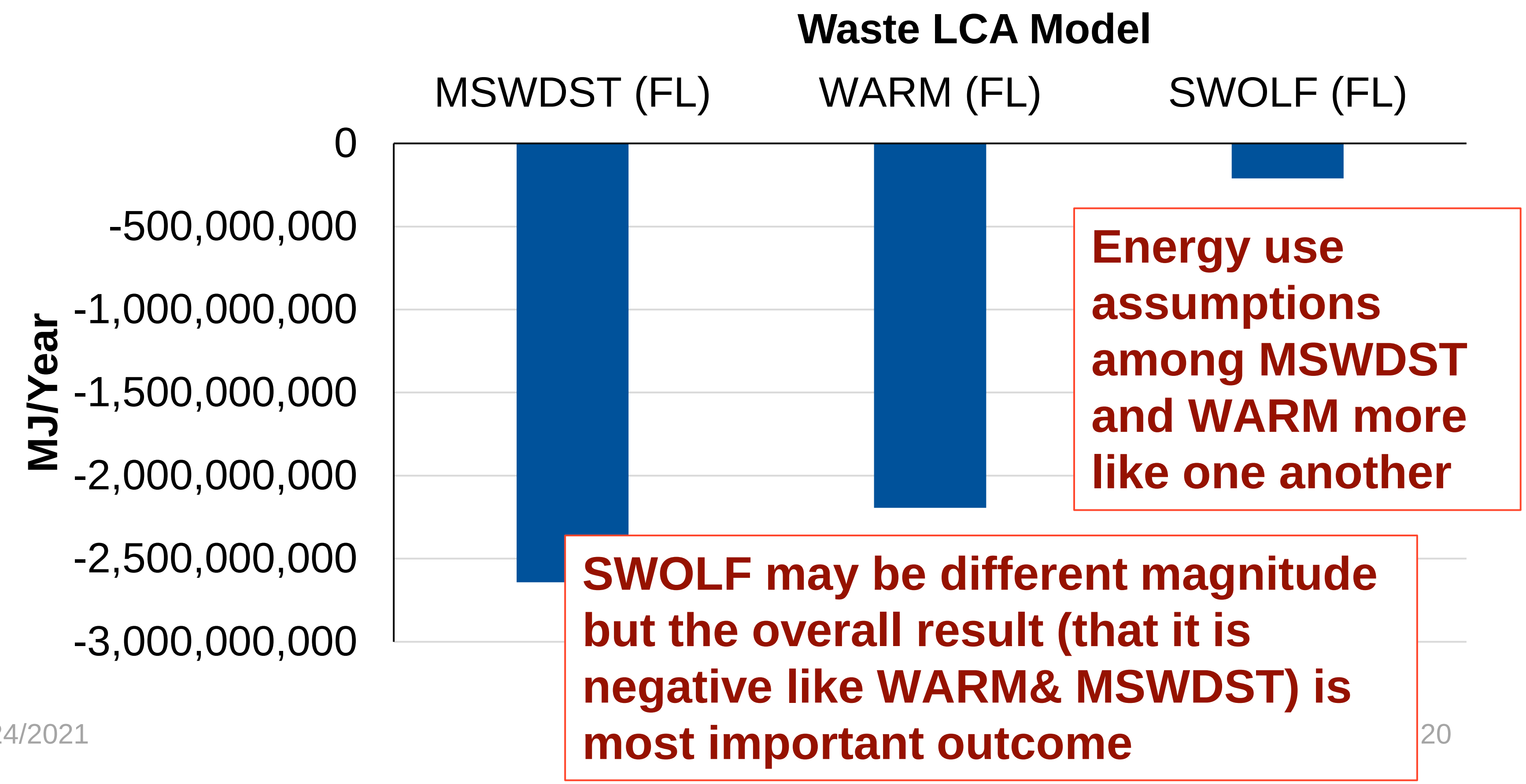


GHG emissions assumptions among the models are overall similar

Decision Making Application

What is the waste management environmental footprint of Alachua county?

Energy Use Waste Management Footprint



Decision Making Application

Using the waste management environmental footprint of Alachua county, which material has the greatest and smallest environmental footprints?

Smallest Footprints	GHG Emissions	Energy Use
MSWDST (FL)	Mixed metals	Mixed metals

GHG emissions and energy use impacts are typically directly related

Decision Making Application

Using the waste management environmental footprint of Alachua county, which material has the greatest and smallest environmental footprints?

Smallest Footprints	GHG Emissions	Energy Use
MSWDST (FL)	Mixed metals	Mixed metals
SWOLF (FL)	Mixed metals	Mixed metals

The smallest footprint is usually associated with a material that has a high recycling rate and a high environmental benefit when recycled

Both SWOLF & MSWDST report recycling metals has highest environmental benefit

Decision Making Application

Using the waste management environmental footprint of Alachua county, which material has the greatest and smallest environmental footprints?

Smallest Footprints	GHG Emissions	Energy Use
MSWDST (FL)	Mixed metals	Mixed metals
SWOLF (FL)	Mixed metals	Mixed metals
WARM (FL)	Cardboard	Mixed metals

WARM agrees with SWOLF & MSWDST that recycling metals is best, however, it awards a "forest carbon storage" environmental benefit for recycling cardboard (when SWOLF & MSWDST do not)

Decision Making Application

Using the waste management environmental footprint of Alachua county, which material has the greatest and smallest environmental footprints?

Smallest Footprints	GHG Emissions	Energy Use
MSWDST (FL)	Mixed metals	Mixed metals
SWOLF (FL)	Mixed metals	Mixed metals
WARM (FL)	Cardboard	Mixed metals

Greatest Footprints	GHG Emissions
MSWDST (FL)	Food Waste
SWOLF (FL)	Food Waste
WARM (FL)	Food Waste

Low recycling/ donation rate and high GHG emissions release when landfilled

Decision Making Application

Using the waste management environmental footprint of Alachua county, which material has the greatest and smallest environmental footprints?

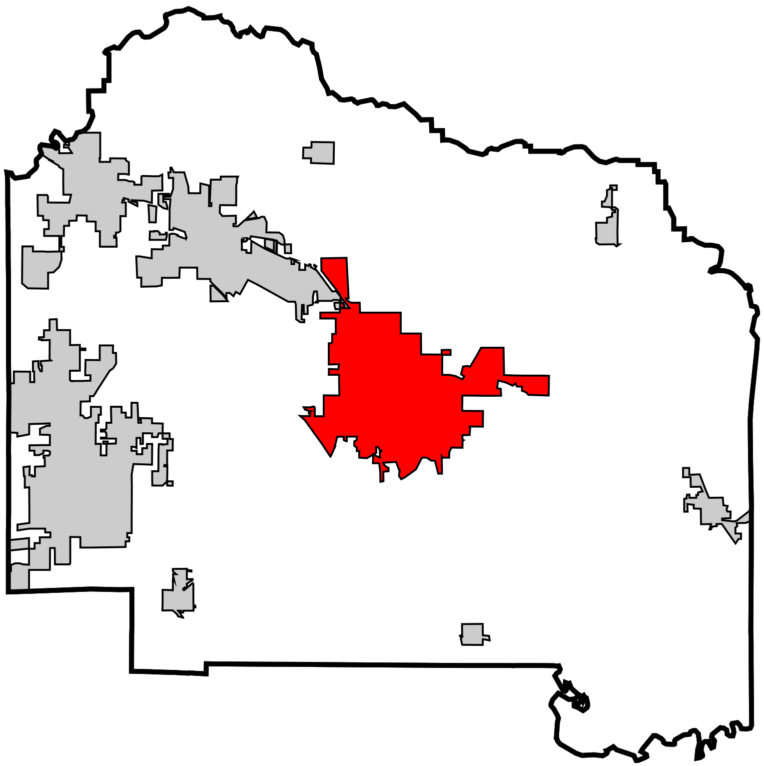
Smallest Footprints	GHG Emissions	Energy Use
MSWDST (FL)	Mixed metals	Mixed metals
SWOLF (FL)	Mixed metals	Mixed metals
WARM (FL)	Cardboard	Mixed metals

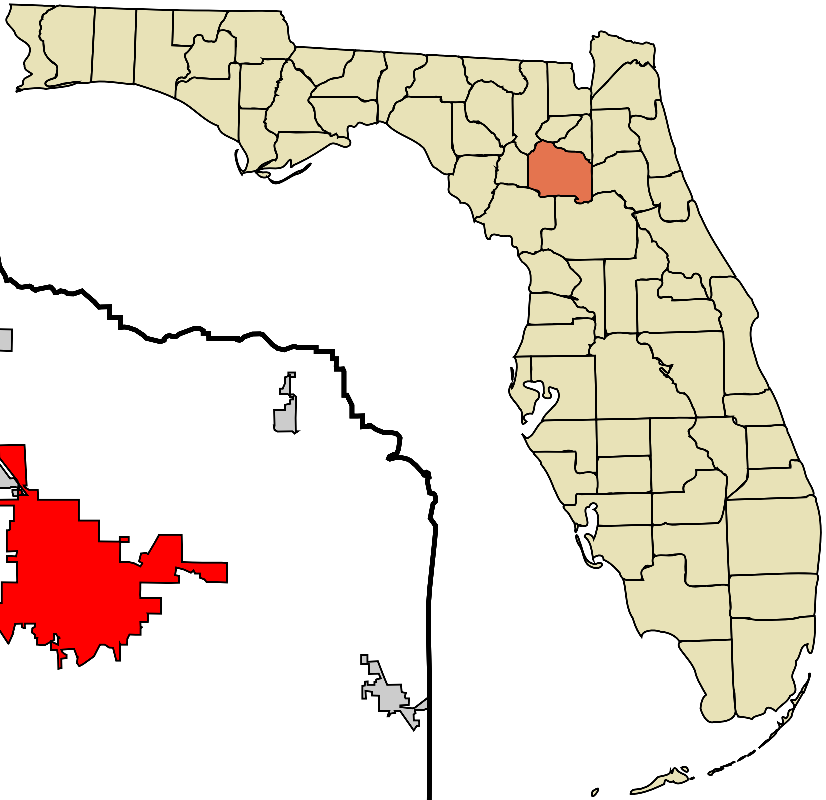
Greatest Footprints	GHG Emissions	Energy Use
MSWDST (FL)	Food Waste	Food Waste
SWOLF (FL)	Food Waste	Mixed MSW
WARM (FL)	Food Waste	Wood products

Overall materials with high biogenic carbon content

Decision Making Application

What is the lifecycle environmental footprint of Alachua county assuming a baseline year of 2013 and current data (2019)?





Decision Making Application

What is the lifecycle environmental footprint of Alachua county assuming a baseline year of 2013 and current data (2019)?

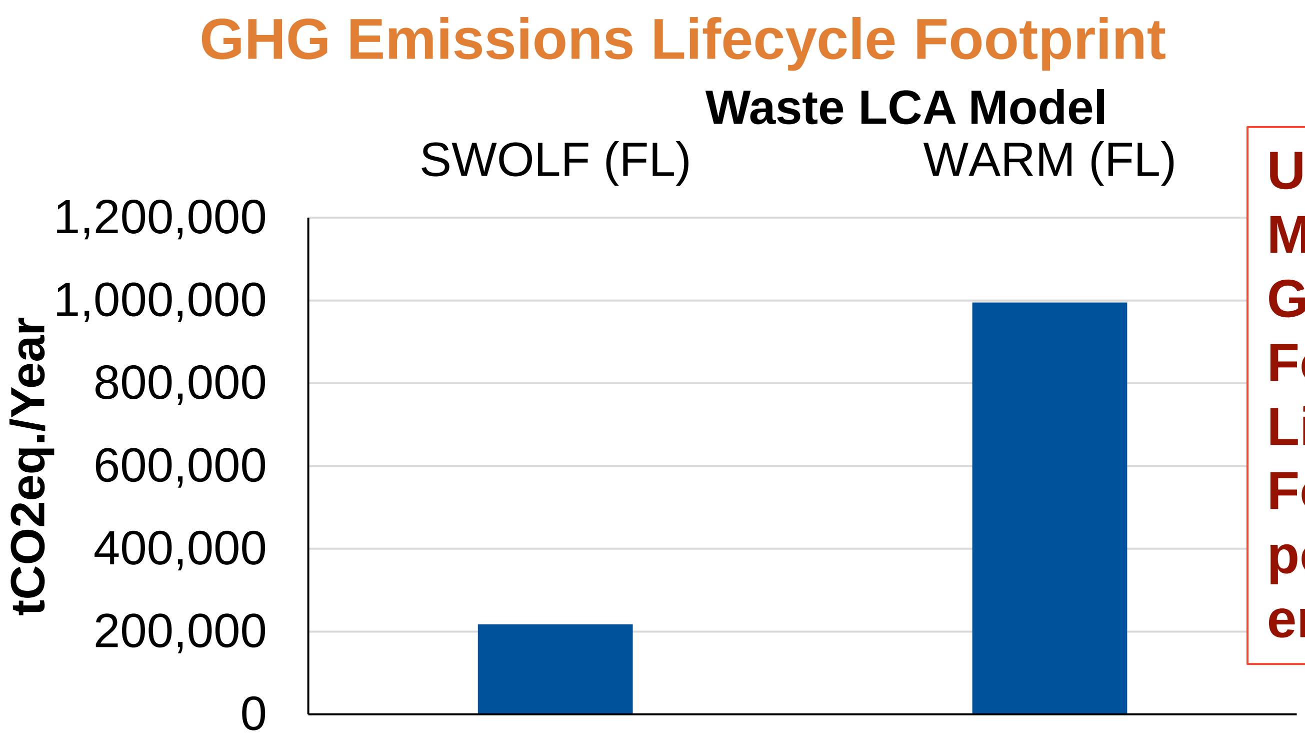
Lifecycle = Source reduced/generated + Donated + Produced + Waste Management

Note:
You will need to use either WARM or Literature option to account for the ***donated*** *environmental impacts.*

To account for ***source reduced/generated*** *and* ***produced*** *environmental impact you will need to use a combination of WARM, SWOLF, and Literature option.*

Decision Making Application

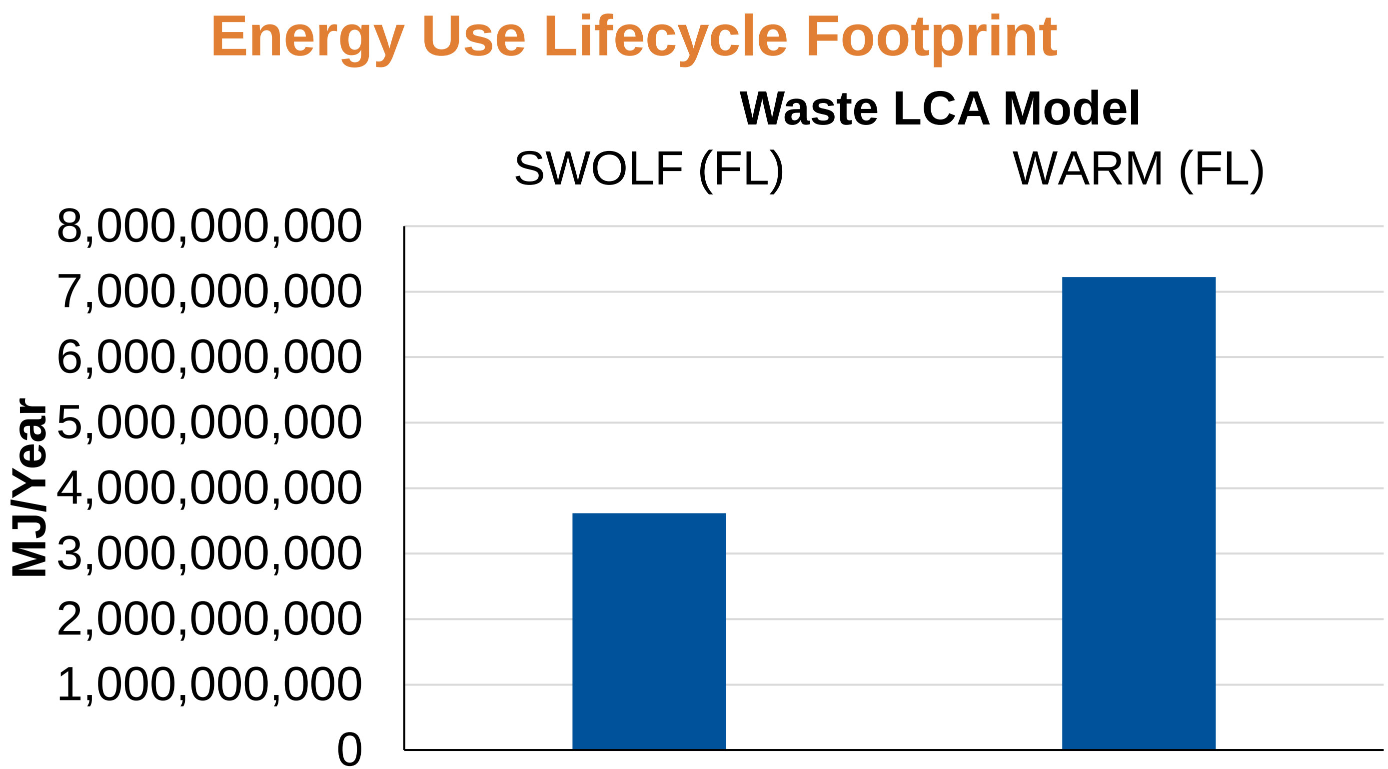
What is the lifecycle environmental footprint of Alachua county assuming a baseline year of 2013 and current data (2019)?



Unlike Waste Management GHG Emissions Footprint the Lifecycle Footprint is positive (an emission)

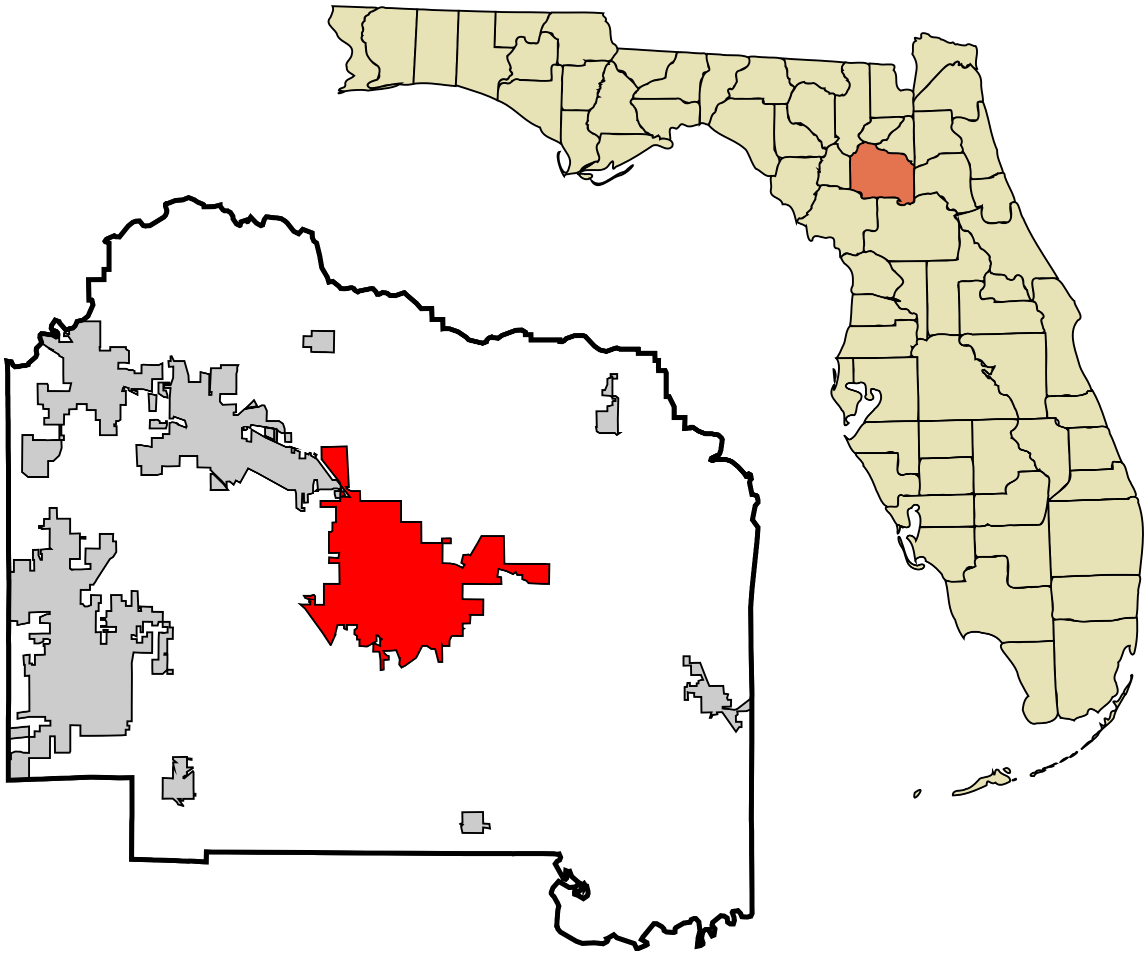
Decision Making Application

What is the lifecycle environmental footprint of Alachua county assuming a baseline year of 2013 and current data (2019)?



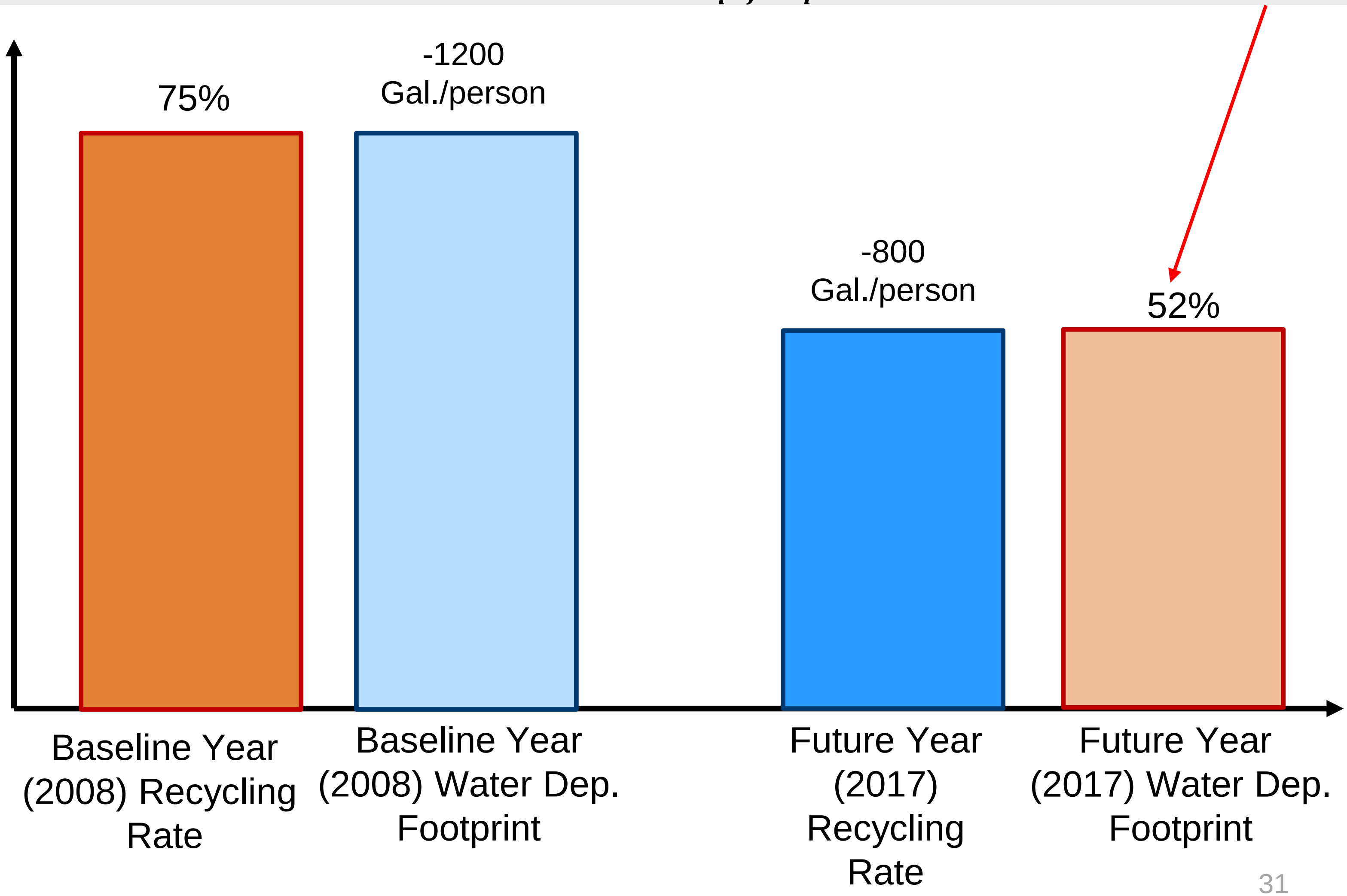
Decision Making Application

How can we use the tool to measure SMM-based goals?



Use the tool to evaluate other metrics for using environmental impacts in goal setting

Water Use-Based Recycling Rate$= \frac{\textit{Future Year Water Dep. footprint}}{\textit{Baseline Year Water Dep. footprint}}(\textbf{Target Recycling Rate}) =$



Use the tool to evaluate other metrics for using environmental impacts in goal setting

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Approaches to integrate sustainable materials management into waste management planning and policy

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ABSTRACT

Many solid waste policy makers are adopting sustainability practices following one of the three most commonly followed approaches: zero-waste, circular economy, and sustainable materials management (SMM). Although some communities have embraced these models, challenges remain to integrate these concepts into solid waste policy and planning. Several approaches for integrating SMM were demonstrated. The approaches centered on using SMM concepts to prioritize and strategically plan for more sustainable waste management and to create performance metrics to track solid waste management system progress. Waste information from five regions were compiled to assess current data adequacy; necessary data were in many cases limited. Findings showed that many of the regions will need to better track and report their individual materials generated and disposed of to more accurately apply SMM. Among the common outcomes of the SMM approaches illustrated was the need to better target specific materials in the waste stream for recovery, such as metal and paper products. Other findings included the need to more effectively promote and track waste reduction efforts given the dramatic beneficial outcomes when using an SMM-based performance metric, such as an energy use reduction goal.

1. Introduction

Communities and governments throughout the world are beginning to promote and embrace more sustainable municipal solid waste (MSW) management practices (Department of Environmental Quality, 2012; Land and Materials Administration, 2018). A variety of names are used to describe these initiatives, including zero-waste, circular economy, and sustainable materials management (SMM). Definitions of each vary among authors, and all approaches espouse similar fundamental objectives: utilize waste products as resources and minimize the environmental burden posed by society's ever-increasing materials consumption (Kirchherr et al., 2017; Silva et al., 2017, 2016); prioritize the design of systems to recirculate resources (Geissdoerfer et al., 2017; Ghisellini et al., 2016; Kirchherr et al., 2017); and encourage communities to reduce materials consumption (Lieder and Rashid, 2016; Witjes and Lozano, 2016).

Many previous studies focused on the description and analysis of a single concept or approach (Andrews, 2015; Bocken et al., 2016; Malinauskaite et al., 2017; Zaman and Lehmann, 2013). A few examinations have attempted to compare and evaluate all three (Silva et al., 2017, 2016). Synthesizing descriptions in previous studies, here we define each concept, list the associated goals, and describe how each model prioritizes waste management practices (referred to as a waste hierarchy). See Table 1.

Despite the similarities of these diversely-defined initiatives, both subtle and not-so-subtle differences emerge when reviewed in their entirety. The zero-waste concept, for example, focuses heavily on the objective of minimizing waste generation and maximizing waste diversion from the traditional disposal methods of incineration and landfilling (Silva et al., 2016). The circular economy approach, on the other hand, directs emphasis on retooling production processes and products themselves in a manner that byproducts and discards are used as feedstocks (as ingredients and energy sources) in processes and manufactured products (Kirchherr et al., 2017). Both concepts consider a material's extraction, processing, and manufacturing stages (upstream life stages), as well as end-of-life management (downstream life stages). The upstream parties are responsible for designing systems that recirculate energy and materials flows to create closed loop systems and prevent waste generation (Andrews, 2015; Bocken et al., 2016; Geissdoerfer et al., 2017; Genovese et al., 2017; Kirchherr et al., 2017; Korhonen et al., 2018; Lieder and Rashid, 2016). Downstream parties are responsible for the end-of-life management of the materials generated upstream. Both the circular economy and zero-waste concepts are limited by the laws of thermodynamics, because even in closed loop systems, resources are consumed and inevitability generate at least some waste (Genovese et al., 2017; Korhonen et al., 2018).

Waste reduction and recycling are embraced in the SMM approach,

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Environmental Science & Technology

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pubs.acs.org/est

Replacing Recycling Rates with Life-Cycle Metrics as Government Materials Management Targets

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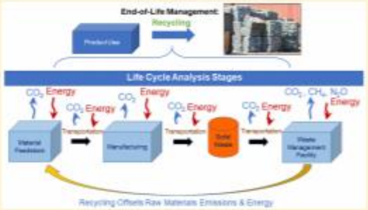
Supporting Information

ABSTRACT: In Florida, the passing of the Energy, Climate Change, and Economic Security Act of 2008 established a statewide mass-based municipal solid waste recycling rate goal of 75% by 2020. In this study, we describe an alternative approach to tracking performance of materials management systems that incorporates life-cycle thinking. Using both greenhouse gas (GHG) emissions and energy use as life-cycle indicators, we create two different materials management baselines based on a hypothetical 75% recycling rate in Florida in 2008. GHG emission and energy use footprints resulting from various 2020 materials management strategies are compared to these baselines, with the results normalized to the same mass-based 75% recycling rate. For most scenarios, LCI-normalized recycling rates are greater than mass-based recycling rates. Materials management strategies that include recycling of curbside-collected materials such as metal, paper, and plastic result in the largest GHG- and energy-normalized recycling rates. Waste prevention or increase, determined as the net difference in per-person mass discard rate for individual materials, is a major contributor to the life-cycle-normalized recycling rates. The methodology outlined here provides policy makers with one means of transitioning to life-cycle thinking in state and local waste management goal setting and planning.



INTRODUCTION

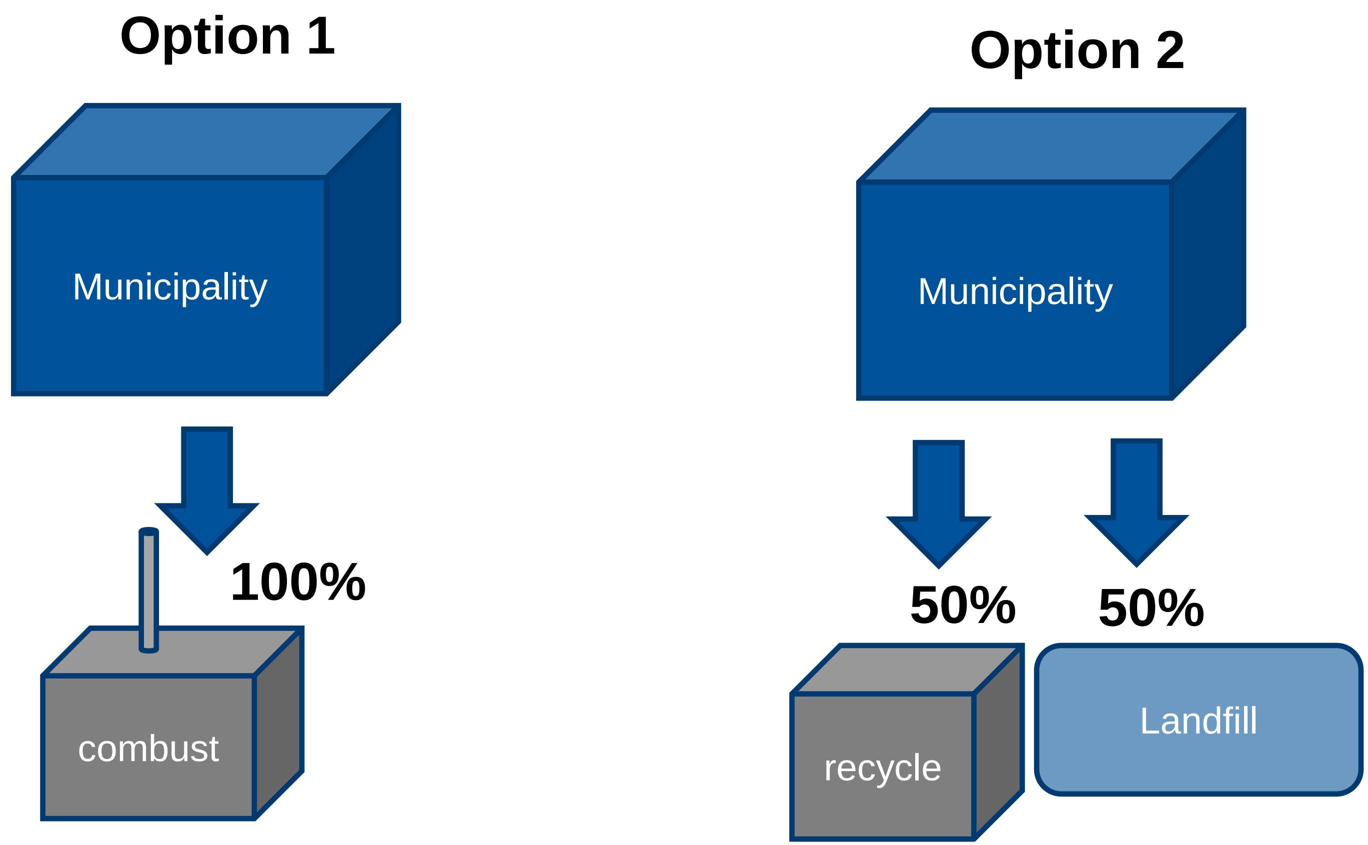
State and local governments in the United States (US) commonly rely on mass-based municipal solid waste (MSW) recycling rate goals or targets to promote sustainable materials management (SMM) and landfill diversion. These goals are typically established by state legislatures or local governments and apply to waste materials generated by households, institutions, and businesses. Examples of these goals include South Carolina (40% recycling),[1] Maryland (55% recycling),[2] Florida (75% recycling),[3] and San Francisco (zero waste),[4] all to be reached by 2020. These recycling rates correspond to the mass of material recycled (or diverted from landfill disposal in some cases) divided by the total mass generated. While providing a tangible target that can be tracked over time to quantify progress, the recycling rate metric suffers from several inherent problems.[5−7] First, a reduction in the overall mass of materials discarded, referred to in this paper as waste prevention (commonly called source reduction by the waste management community) and the most desired step in the waste management hierarchy,[6,8−10] is not appropriately recognized in mass-based recycling rates. For example, a

A second problem with mass-based recycling goals is that they favor heavier materials without considering the environmental benefits gained through recycling. In reality, the recycling of some waste components produces much greater environmental benefits (e.g., avoidance of greenhouse gas (GHG) emissions and energy use) than others.[11−13] For example, recycling aluminum cans and office paper provides a considerably greater GHG emission and energy use avoidance than recycling (in some cases through composting) equivalent masses of glass, yard trash (YT), or food waste.[14] Also, a singular reliance on recycling rates neglects the positive contributions from other SMM approaches, including changes in product and packaging design, the recovery of energy from waste (EfW), and the implementation of more sustainable landfill practices.[13]

This study examines a different approach to mass-based recycling rates for quantifying and tracking progress toward SMM. One potential alternative is to measure materials management progress relative to the mass of material recycled or landfilled at an initial point in time. For example, California has established a statewide recycling goal corresponding to 75%

Hypothetical Problem

A municipality is evaluating two option for managing cardboard in their waste stream. If they collect 20 tons per day of cardboard. Which option results in the lowest GHG emissions ($tCO_2eq.$) per day?



Example Problem

Option 1- 100% combust

$$20\frac{tons}{day} * 100\%$$

Option 2- 50% recycle & 50% landfill

$$20\frac{tons}{day} * 50\%$$

$$20\frac{tons}{day} * 50\%$$

Example Problem

From “4 SMM Input”: Selected MSWDST (FL)

All Units (tCO_2eq./ Short Ton)

Material Category	Item No.	Material Type	Recycling	Landfill	Combustion
MSW	1	Mixed MSW	NA	(0.18)	(0.27)
	2	Newspaper	(0.83)	(1.35)	(1.18)
	3	Corrugated Cardboard (OCC)	0.19	(0.77)	(1.08)

Example Problem

Option 1- 100% combust

$$20 \frac{tons}{day} * 100\% * -1.08 \frac{tCO_2eq.}{ton\ cardboard\ combusted} =$$

Option 2- 50% recycle & 50% landfill

$$20 \frac{tons}{day} * 50\% * 0.19 \frac{tCO_2eq.}{ton\ cardboard\ recycled} =$$

$$20 \frac{tons}{day} * 50\% * -0.77 \frac{tCO_2eq.}{ton\ cardboard\ landfilled} =$$

Example Problem

Option 1- 100% combust

$$20\frac{tons}{day} * 100\% * -1.08\ \frac{tCO_2eq.}{ton\ cardboard\ combusted} = -22\ \frac{tCO_2eq.}{day}$$

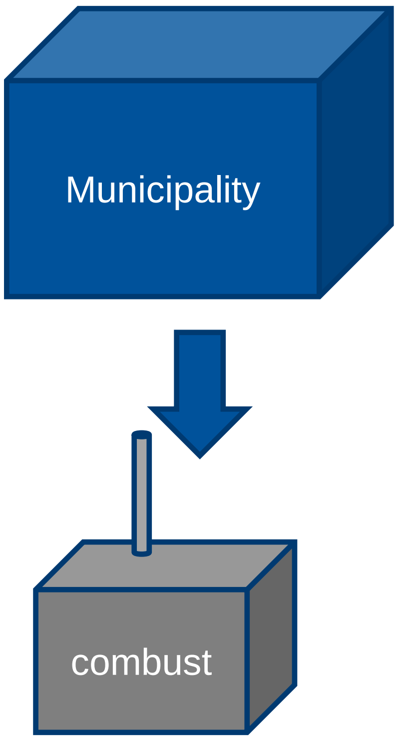
Option 2- 50% recycle & 50% landfill

$$20\frac{tons}{day} * 50\% * 0.19\ \frac{tCO_2eq.}{ton\ cardboard\ recycled} = 2\ \frac{tCO_2eq.}{day}$$

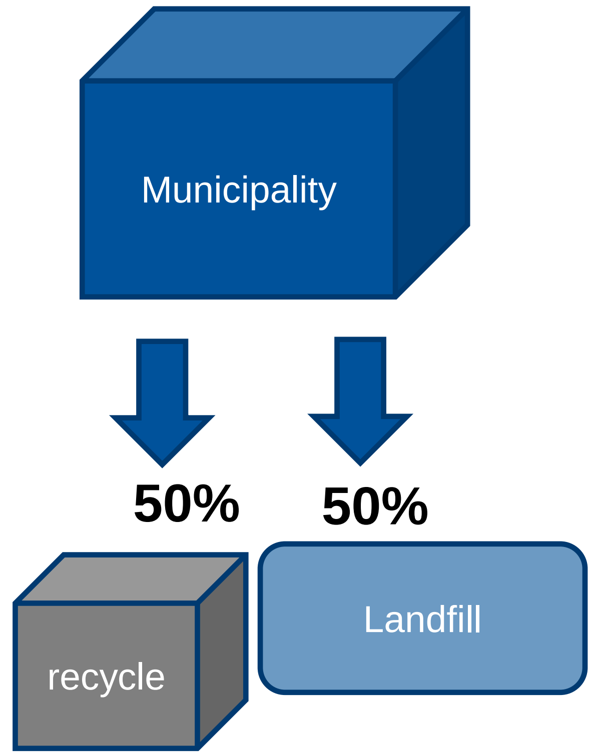
$$20\frac{tons}{day} * 50\% * -0.77\ \frac{tCO_2eq.}{ton\ cardboard\ landfilled} = -8\ \frac{tCO_2eq.}{day}$$

$$2 + (-8) = -6\ \frac{tCO_2eq.}{day}$$

Option 1 = $-22\,\frac{tCO_2eq.}{day}$



Option 2 = $-6\,\frac{tCO_2eq.}{day}$



Option 2 is the recommend approach because it has a greater GHG emissions offset footprint.

Key Takeaways

Q. Since there are three models, which should be used?

A. To measure your waste management footprint recommend using all three models and comparing results.

Q. Since there are nine indicators, which should be used?

A. Recommend at least two indicators should be selected and whichever is most important to your community.

Q. How should I measure a lifecycle footprint?

A. Recommend taking an iterative approach, where you do your own calculations using the produced and donated LCI factors from WARM, SWOLF, and Literature

Q & A Time

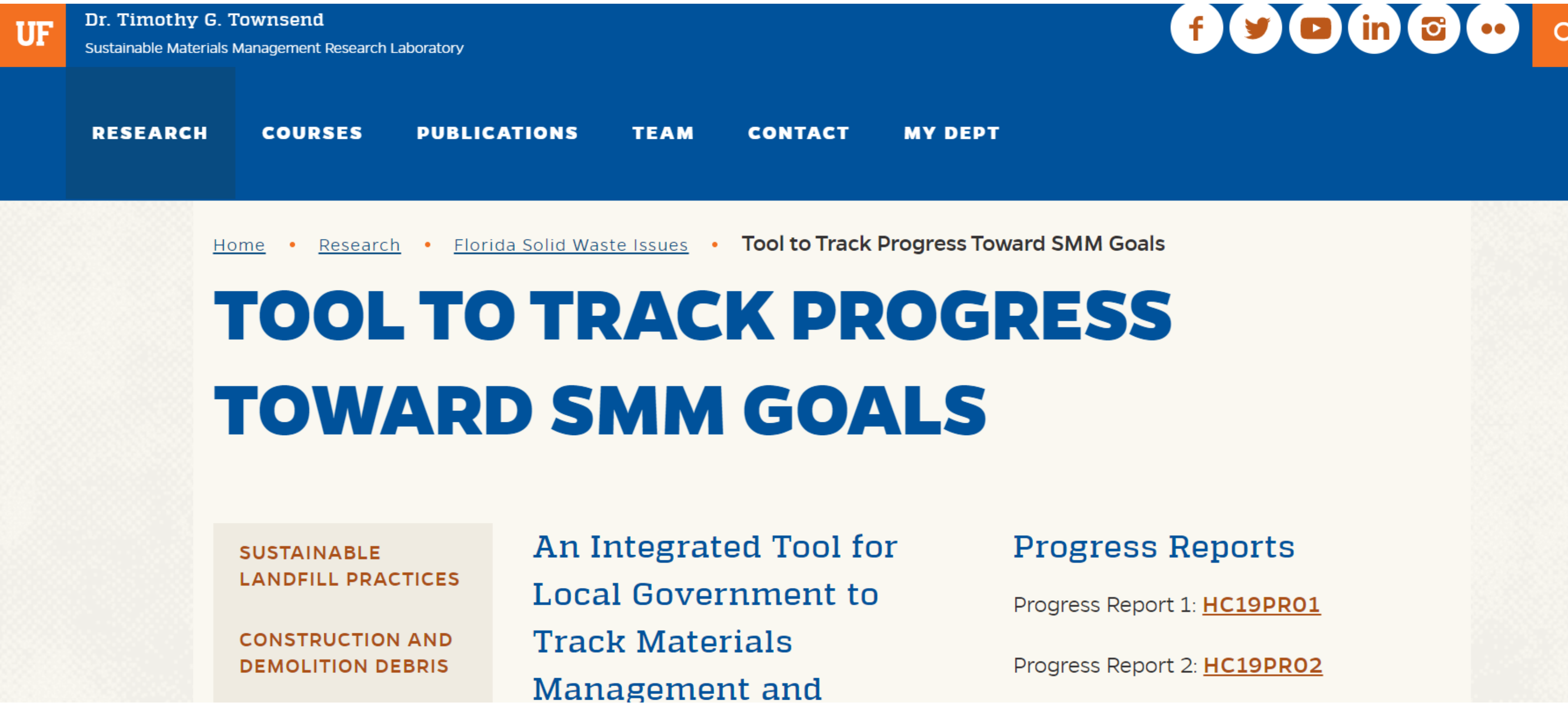
Q. Is there a report that has all the background methods and data?
A. Yes! Please visit our project website here:

Q. Can this tool be used for education purposes and lesson planning?
A. Yes; we recommend using the LCI factors directly in Tab 6 “LCI factors” instead of trying to figure out the mass data in other Tabs.

Q. Can this tool be used for zero waste planning?
A. Yes; we recommend using the LCI factors for produced and donated to be able to measure the environmental impact of reuse and source reduction!

Q. When and where is the tool/report available?
A. June 30th on our project website https://faculty.eng.ufl.edu/timothy-townsend/research/florida-solid-waste-issues/tool-to-track-progress-toward-smm-goals/

Source: https://faculty.eng.ufl.edu/timothy-townsend/research/florida-solid-waste-issues/tool-to-track-progress-toward-smm-goals/



Thank You for Your Time!

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