American Carbon Registry
AT WINROCK INTERNATIONAL

CALCULATOR TOOL USER GUIDE FOR THE QUANTIFICATION AND REGISTRATION OF ENVIRONMENTAL IMPACTS OF GREEN FINANCE FOR

DIVERSION OF ORGANIC WASTE FOR COMPOSTING PROJECTS

VERSION 1.0

July 2021

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American Carbon Registry®

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ABOUT AMERICAN CARBON REGISTRY® (ACR)

ACR is a scientific standards body for the creation of environmental assets. This includes tradable assets like carbon offset credits issued by ACR Environmental Markets and the quantification of environmental attributes of financial instruments by ACR Capital Markets. We complement decades of expertise in the development of market-making standards and project measurement methodologies with operational expertise in the verification, registration, issuance, retirement, and reporting of environmental claims.

ACRONYMS

ACR	American Carbon Registry
CNG	Compressed natural gas
CO_2e	Carbon dioxide equivalent
CUSIP	Committee on Uniform Securities Identification Procedures
EPA	United States Environmental Protection Agency
GHG	Greenhouse gas
ISIN	International Securities Identification Number
KPI	Key performance indicator
LFG	Landfill gas
MT	Metric ton
NSPS	New Source Performance Standard
RNG	Renewable natural gas

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1 INTRODUCTION

The American Carbon Registry (ACR) developed methods to quantify environmental key performance indicators (KPIs) for bond-funded activities related to the diversion of organic waste for composting. The Methodology calculates a project's Carbon Return and applies a benchmark to assess a project's impact relative to investments in the same category. The Methodology quantifies the following environmental benefits:

- GHG emission reductions
- Landfill diversion
- Compost production

The Methodology is a technical document that includes project eligibility data requirements, quantification approach, and project data requirements. To make these methods accessible to issuers, ACR created an accompanying Calculator Tool that embeds the methods and equations found in the Methodology. **This User Guide is a supplement to the Methodology and provides instructions on how to use the Calculator Tool.**

The Methodology for the Quantification and Registration of Environmental Impacts of Green Finance for Diversion of Organic Waste for Composting Projects and the accompanying Calculator Tool are available at www.winrock.org/ms/acr-capital-markets. The online Calculator Tool is password protected. Email ACRcapitalmarkets@winrock.org to request access.

2 CALCULATOR TOOL INPUTS

The Methodology relies on project-specific data to assess the environmental impacts of a diversion of organic waste for composting project. Users will input these data into the Calculator Tool. This Chapter defines the inputs used for quantifying the KPIs and guides users on making appropriate selections in the Calculator Tool. Project data fall into six categories and are detailed in the sections below.

2.1 GENERAL PROJECT INFORMATION

- **Bond issuer:** Entity issuing the bond (i.e., city, state, county, other government entity, or corporation)
- **CUSIP number:** Nine character alphanumeric code serving as a unique identifier for bonds registered in North America
- **ISIN:** Twelve character alphanumeric code serving as a unique identifier for bonds registered outside of North America, if applicable
- **Bond name:** Bond name as used in bond official statement
- **Project name:** Project name funded with bond proceeds
- **Contact person (name, title):** Contact person responsible for completing or responding to inquiries related to issuer's use of the Methodology and Calculator Tool
- **Contact email:** Email address for the contact person identified
- **Contact phone:** Phone number for the contact person identified
- **Total bond financing for the diversion of organic waste for composting project (in U.S. dollars):** Amount of money from the bond used for the project
- **Total project cost (in U.S. dollars):** Amount of money from all sources required for the project

2.2 LANDFILL INFORMATION

- **Location of landfill from which material is diverted (state):** Select the state where the landfill is located from the dropdown menu.
- **Existence of a landfill gas (LFG) capture system at landfill from which material is diverted:** Select "Yes" or "No" from the dropdown menu to indicate whether the landfill from which material is diverted has an LFG capture system. A collection system may be passive or active and is typically composed of a series of gas collection wells placed throughout the landfill to help control odors, minimize emissions, and increase safety. Many landfills install gas capture systems to comply with regulatory requirements.

If no, proceed to Composting Operation Information (Subsection 2.3). If yes, proceed to the next field.

- **Moisture conditions:** Select the moisture conditions that most accurately describe the average conditions at the landfill from the dropdown menu:
  - Dry: <20 inches of precipitation/year
  - Moderate: 20-40 inches of precipitation/year
  - Wet: >40 inches of precipitation/year
  - Bioreactor: Water is added until the moisture content reaches 40 percent moisture on a wet weight basis
- **Gas collection efficiency:** The LFG collection efficiency will vary throughout the life of the landfill. Select the gas collection efficiency that most accurately describes system from the dropdown menu:
  - Worst-case gas collection: Years 0-4: 0%; Years 5-9: 50%; Years 10-14: 75%; Years 15 to 1 year before final cover: 82.5%; Final Cover: 90%

    This scenario represents a landfill that is in compliance with the U.S. EPA's New Source Performance Standard (NSPS).
  - Typical operation: Years 0-1: 0%; Years 2-4: 50%; Years 5-14: 75%; Years 15 to 1 year before final cover: 82.5%; Final Cover: 90%

    This scenario represents the average U.S. landfill, although every landfill is unique.
  - Aggressive gas collection: Years 0: 0%; Years 0.5-2: 50%; Years 3-14: 75%; Years 15 to 1 year before final cover: 82.5%; Final Cover: 90%

    This scenario includes landfills where the operator is aggressive in gas collection relative to a typical landfill. Bioreactor landfills, which are operated to accelerate decomposition, are assumed to collect gas aggressively.
  - California regulatory collection: Years 0: 0%; Year 1: 50%; Years 2-7: 80%; Years 8 to 1 year before final cover: 85%; Final Cover: 90%

    This scenario represents compliance with California's regulatory requirements.
- **Primary end-use for gas:** Select "Gas is recovered for energy" or "Gas is flared" from the dropdown menu to indicate the primary way that collected LFG is used or destructed.
- **Percentage of gas sent to primary end-use:** Enter the percent of LFG sent for the primary end-use.

If 100%, proceed to Anaerobic Digester Information. If less than 100%, proceed to the next field.

- **Secondary end-use for gas:** Select "Gas is recovered for energy" or "Gas is flared" from the dropdown menu to indicate the secondary way that collected LFG is used or destructed.

2.3 COMPOSTING OPERATION INFORMATION

- **Project operational life (years):** The Methodology assumes (and Calculator Tool defaults to) an operational life of 25 years for an organic waste diversion for composting project. Individual project operational lives may vary. If entering a different operational life, project proponents must substantiate the alternative project duration with documentation (i.e., equipment manufacturer specifications, operator's project performance record, or organic waste processing contracts).
- **Duration of initial start-up period prior to full operation (years):** Enter the number of years expected prior to the facility operating at full capacity when the quantity of diverted material may be lower.
- **Composting operation type:** Select the type of composting operation from the dropdown menu:
  - **Windrow:** Compost operation that involves forming organic waste into rows of long piles maintained under aerobic conditions. Periodic aeration occurs by either manually or mechanically turning the piles.
  - **Aerated Static Pile:** Compost operation that involves forced aeration using pumps to push or pull air through static piles. Systems may use positive or negative aeration. Positive aeration uses pumps to force air into the pile and may rely on beneficial microbes living just under the cover. Negative aeration uses pumps to suck air through the pile and typically route the pulled air through a device such as a biofilter or a furnace.
  - **Covered Aerated Static Pile:** Compost operation that adds an impermeable cover to an ASP compost system to capture and control emissions.
  - **In-Vessel Composting:** Compost operation confined within a building, container, tank, or other vessel in which air flow and emissions are controlled.

2.4 DIVERTED MATERIAL INFORMATION

- **Quantity of organic material diverted from a landfill and composted.** Each category is split between the quantity of material diverted during the initial start-up period and the quantity of material diverted during the remainder of the operational life.
  - **Mixed organics (short tons/year):** Mixed food and yard waste, default weighted as 53 percent food waste and 47 percent yard waste.

If the composition of diverted waste is unknown, enter the annual quantity of diverted organic material as mixed organics and proceed to Quantity of Residual Material Initially Diverted but Later Landfilled by Project.

If the composition of diverted waste is known, enter the quantities, by waste type:

- **Food waste (short tons/year):** Uneaten food from residences, commercial establishments such as grocery stores and restaurants, institutional sources such as school cafeterias, and industrial sources such as factory lunchrooms.

  The U.S. EPA has not yet analyzed differences in GHG emissions by food waste type in the composting pathway. Therefore, the emission factors are the same for each food waste type.
- **Yard waste (short tons/year):** Yard trimmings from residential, institutional, and commercial sources, default weighted as 50 percent grass, 25 percent leaves, and 25 percent tree and brush trimmings.

- **Quantity of residual material initially diverted but later landfilled by project (short tons/year):** Material initially diverted but later sent back to a landfill rather than transformed into finished compost.

2.5 FINISHED COMPOST INFORMATION

- **Percent of finished compost distributed for land application (%):** Enter the percent of the total finished compost that will be land applied.

2.6 TRANSPORTATION INFORMATION

- **Average distance traveled to transport diverted waste from curb to compost facility (miles):** Select the distance range that most accurately reflects the average distance traveled to transport diverted waste from curb collection to the compost facility:
  - ≤50 miles
  - 51-100 miles
  - 101-150 miles
  - 151-200 miles
  - >200 miles

If the average distance is unknown, leave blank and proceed to the next field.

- **Average distance traveled to transport waste from curb to landfill (miles):** Select the distance range that most accurately reflects the average distance traveled to transport waste from curb collection to the landfill:
  - ≤50 miles
  - 51-100 miles
  - 101-150 miles
  - 151-200 miles
  - >200 miles

If the average distance is unknown, leave blank and proceed to the next field.

- **Average distance traveled to transport residual material from compost facility to landfill (miles):** Select the distance range that most accurately reflects the average distance traveled to transport residual material:
  - ≤50 miles
  - 51-100 miles
  - 101-150 miles
  - 151-200 miles
  - >200 miles

If the average distance is unknown, leave blank.

- **Average distance traveled to transport compost from facility to application site (miles):** Select the distance range that most accurately reflects the average distance traveled to transport finished compost:
  - ≤50 miles
  - 51-100 miles
  - 101-150 miles
  - 151-200 miles
  - >200 miles

If the average distance is unknown, leave blank.

- **Alternative fuel solid waste collection vehicles:** Select "Yes" or "No" from the dropdown menu to indicate whether the diverted or residual material is transported in alternative fuel vehicles.

If no, proceed to results page. If yes, proceed to the next field.

- **Percentage of fleet biodiesel**: Enter the percent of the waste collection vehicle fleet that is fueled with biodiesel.
- **Percentage of fleet CNG**: Enter the percent of the waste collection vehicle fleet that is fueled with CNG.
- **Percentage of fleet RNG**: Enter the percent of the waste collection vehicle fleet that is fueled with RNG.
- **Percentage of fleet hydrogen**: Enter the percent of the waste collection vehicle fleet that is fueled with hydrogen.
- **Percentage of fleet electric**: Enter the percent of the waste collection vehicle fleet that is fueled with electricity.

3 CALCULATOR TOOL OUTPUTS

After entering the project data inputs into the Calculator Tool, the resulting KPIs are displayed as outputs, pictured below.

Figure 1: Image of Calculator Tool Outputs

KEY PERFORMANCE INDICATOR	TOTAL	PRO-RATED (IF APPLICABLE)	REPRESENTATIVE YEAR	UNIT	SUSTAINABLE DEVELOPMENT GOAL
GHG Impact from Project Operations				Metric tons carbon dioxide equivalent ($MTCO_2e$) emission reductions	
Primary GHG Impact from Project Operations				$MTCO_2e$ emission reductions	
Potential Secondary GHG Impact from Project Operations				$MTCO_2e$ emission reductions	
Carbon Return			N/A	$MTCO_2e$ emission reductions/$1,000 bond financing/years of project operation	
GHG Cost Effectiveness			N/A	$MTCO_2e$ emission reductions/$1,000 bond financing	
Social Cost of Carbon Benefit				$, in thousands	
Project GHG Impact Compared to Benchmark		N/A		$MTCO_2e$ emission reductions compared to benchmark	
Project GHG Impact Compared to Benchmark		N/A		% relative to benchmark	
Net Organic Material Diverted from Landfills				short tons	
Net Material Diverted Per Dollar Invested			N/A	short tons/$1,000 bond financing	
Compost Produced				short tons	
Compost Produced Per Dollar Invested			N/A	short tons/$1,000 bond financing	