

# What Happens to NYC's Organic Waste?



Clare Miflin, Executive Director, Center for Zero Waste Design

Clare is a circular systems thinker with over 20 years of experience as an architect in NYC, designing buildings to the highest environmental standards. In 2017 she led the development of the Zero Waste Design Guidelines through a multidisciplinary collaborative process, to show how design of the urban environment plays a crucial role in achieving zero waste. She leads the non-profit Center for Zero Waste Design and the consultancy ThinkWoven, which designs ways to weave urban systems into ecosystems



Justin Green, Founder and Executive Director of Big Reuse

Big Reuse advances NYC's sustainable urban environment through circular economy programs that divert waste from our landfills and reduce greenhouse gasses in the atmosphere. The Big Reuse Center takes in tens of thousands of donated items that are resold and kept in use by thousands of new owners, keeping them out of the landfill. Through the NYC Compost Project and Curbside Composting Outreach we help New Yorkers sustain city-wide composting programs that collect food scraps and turn them into compost used to enrich soil across NYC and strengthen our green infrastructure against climate change.



Frank Franciosi, Executive Director, US Composting Council.

Mr. Franciosi is the current Executive Director of both the US Composting Council and the Compost Research & Education Foundation. He has spent over 30 years working with residuals management and composting both in operations management as well as sales and marketing. As past principal of Akkadia Consulting, Frank provided professional consulting services on projects of animal waste management, biosolids management, coal ash residuals, composting of industrial residuals, product development and marketing. He has a BS in Plant and Soil Sciences from West Virginia University



Jane Gajwani, Director of the Office of Energy and Resource Recovery, Department of Environmental Protection.

Jane Gajwani is a Professional Engineer with over 25 years of experience working in the intersection of water and energy. As the Director of the Office of Energy and Resource Recovery Programs and the Agency Chief Decarbonization Officer for the New York City Department of Environmental Protection, she and her group are tasked with plotting the course for the Agency to achieve both carbon and energy neutrality. Prior to joining DEP, she developed greenhouse gas and energy reduction strategies on the municipal, regional, and national levels within the water and waste sectors. She has both Master's and Bachelor's degrees in Chemical Engineering from The Cooper Union.



Sandy Nurse, District 37 City Council Member

Council Member Sandy Nurse is a community organizer and the new Council Member representing District 37. Sandy is the founder of BK ROT, a co-founder of the Mayday Space, a direct action organizer, and a carpenter. Through years of strong community partnerships and collaborations, Sandy has built neighborhood institutions that directly strengthen grassroots movements in Bushwick and East New York. She has committed her life to addressing issues through direct interventions and solutions including building farms in our food deserts, creating jobs where we have high unemployment, and helping develop community space where it was scarce.

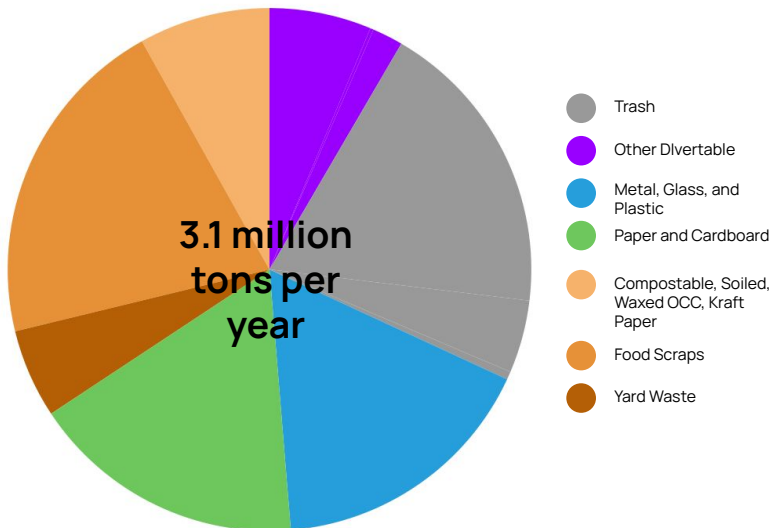
# DSNY Collected Waste

1 M tons/ year  
organic waste

252,000 tons  
Compostable, Soiled,  
Waxed OCC, Kraft Paper

644,000 tons  
Food Scraps

171,000 tons  
Yard Waste



**DSNY** collect from residences, NYCHA, institutions, city properties and some parks

**Commercial haulers** collect a similar amount of waste from private businesses, which generate about 1 million tons of food waste per year.

DSNY mandate that large food generators have to separate food scraps.

# DSNY Organic Waste in 2022



Food Scrap Drop-Off Sites



Seasonal Christmas Trees



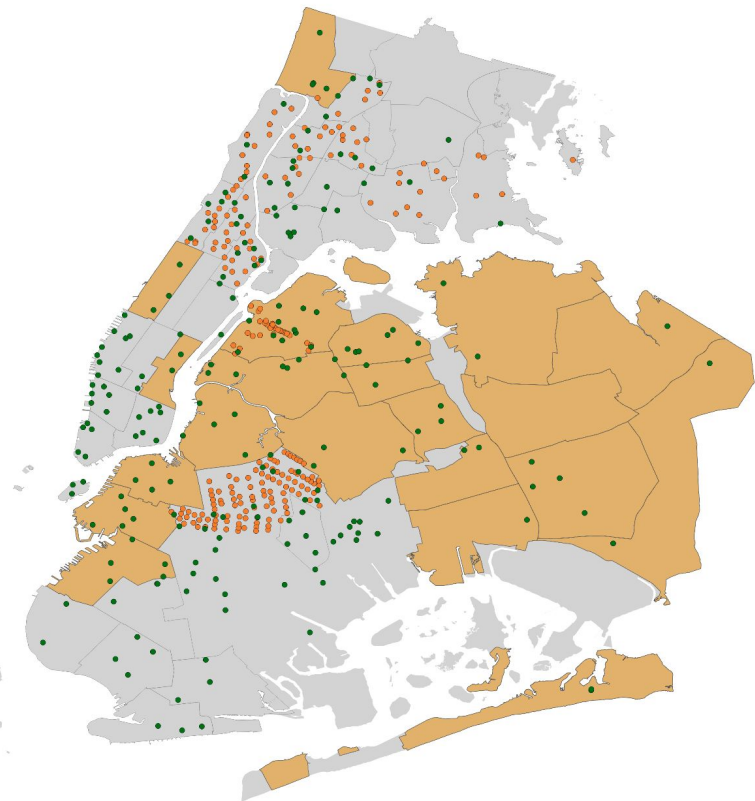
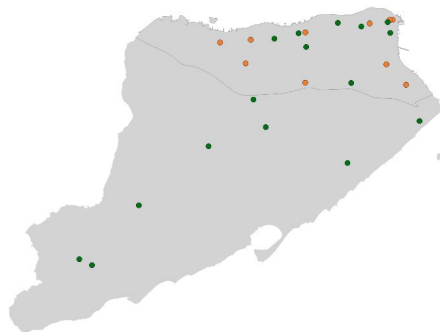
Seasonal Leaves



Smart Bins

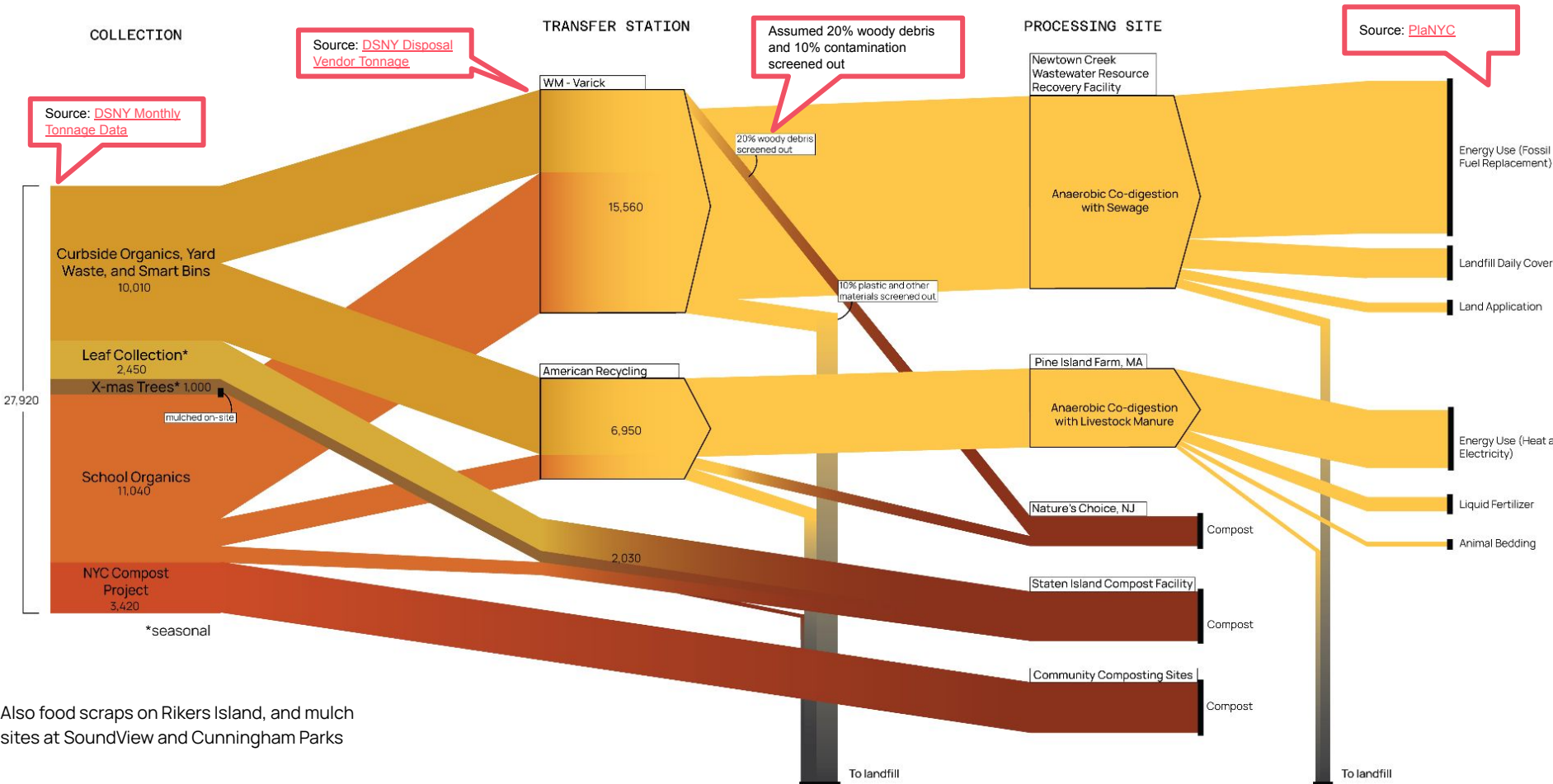


Residential and Institutional Curbside



- Receiving Service
- Food Scrap Drop Off (some managed by others)
- DSNY Smart Bin

source: Summary of Service 2022



Also food scraps on Rikers Island, and mulch sites at SoundView and Cunningham Parks

All amounts are tons per year, for 2022



# Where is processing happening?

Also food scraps on Rikers Island, and mulch sites at SoundView and Cunningham Parks



# Types of organic waste



Compostable fiber products



Compostable plastics and biobags



Dog waste



Sewage (combined with stormwater)



Yard Waste (leaves, tree trimmings etc.)



Food soiled paper



Vegetable scraps



Meat, Dairy, cooked food, starches



Fat, oil, and grease





## Community Composting







## Municipal Composting





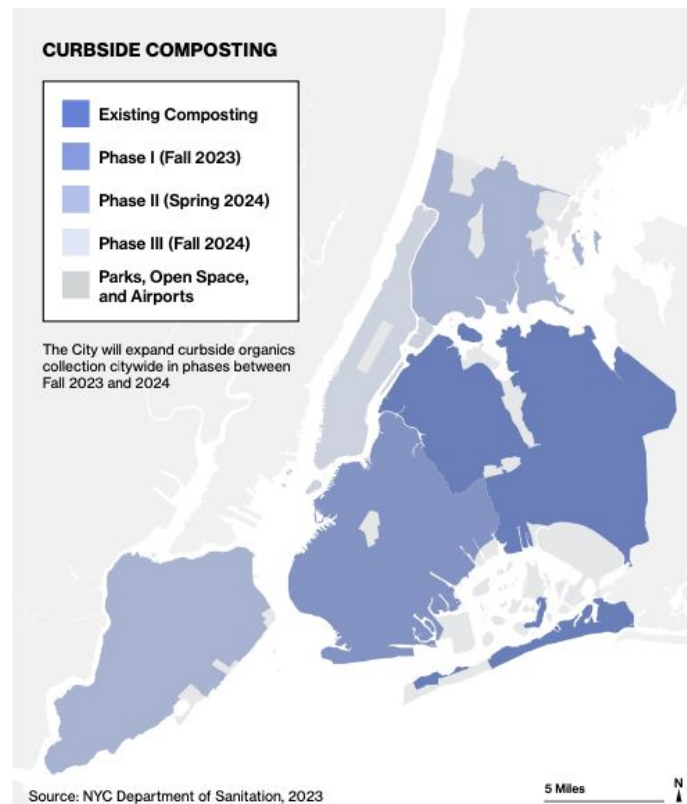


# Municipal Anaerobic Digestion



# How much more organic waste will DSNY collect?

- By Fall 2024 all boroughs will have curbside collection
- Seasonal yard waste separation will be mandatory.
- Food scrap drop-offs and community composting will likely be reduced

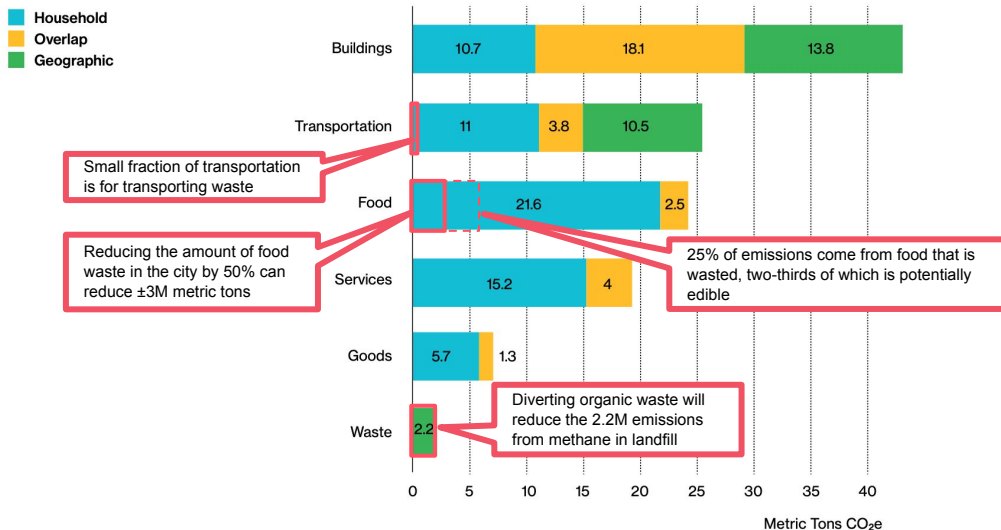


Source: [PlaNYC, 2022](#)

Source: [NYC Program to Eliminate the Gap Budget, p. 47](#)

# NYC's Greenhouse Gas Emissions Goals

NYC INTEGRATED INVENTORY: HOUSEHOLD CONSUMPTION-BASED AND CITYWIDE GREENHOUSE GAS INVENTORY, 2021



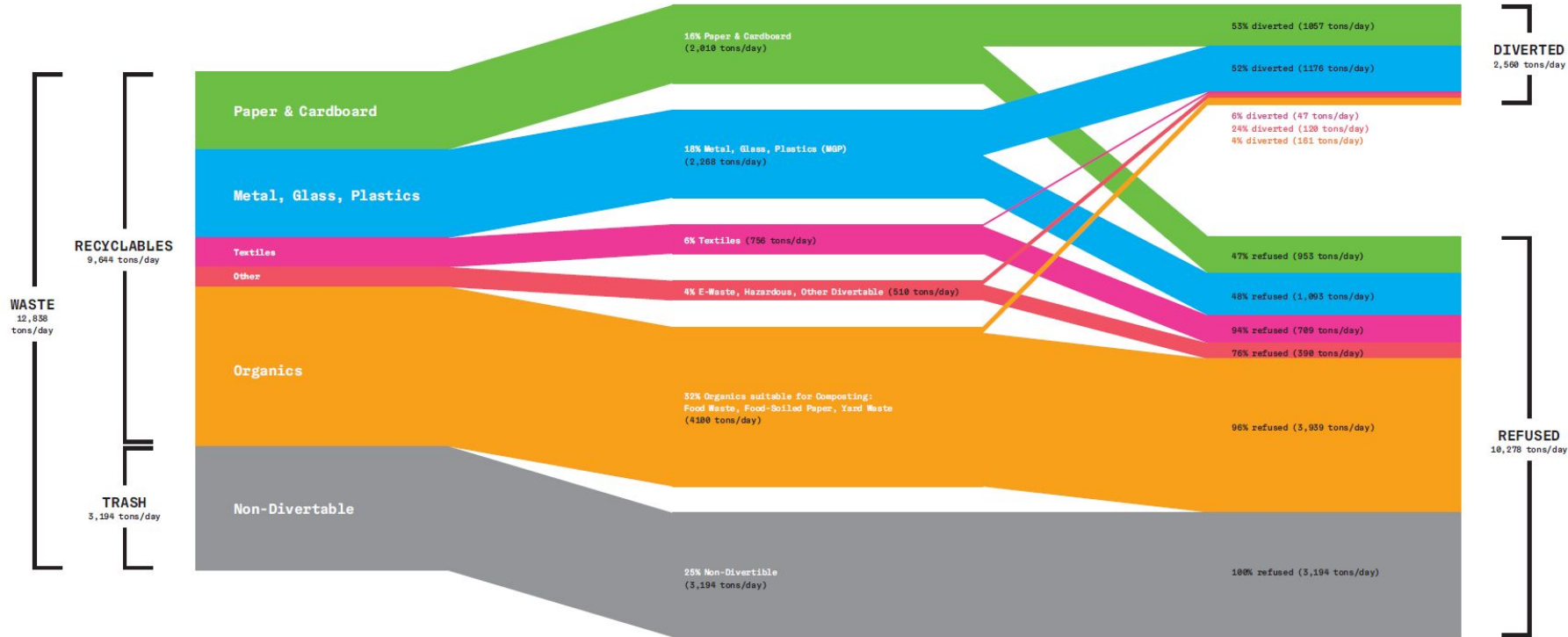
## NYC Goals

- Reduce carbon emissions 80% from 2005 baseline to 2050
- Reduce food waste 50% from 2016 to 2030

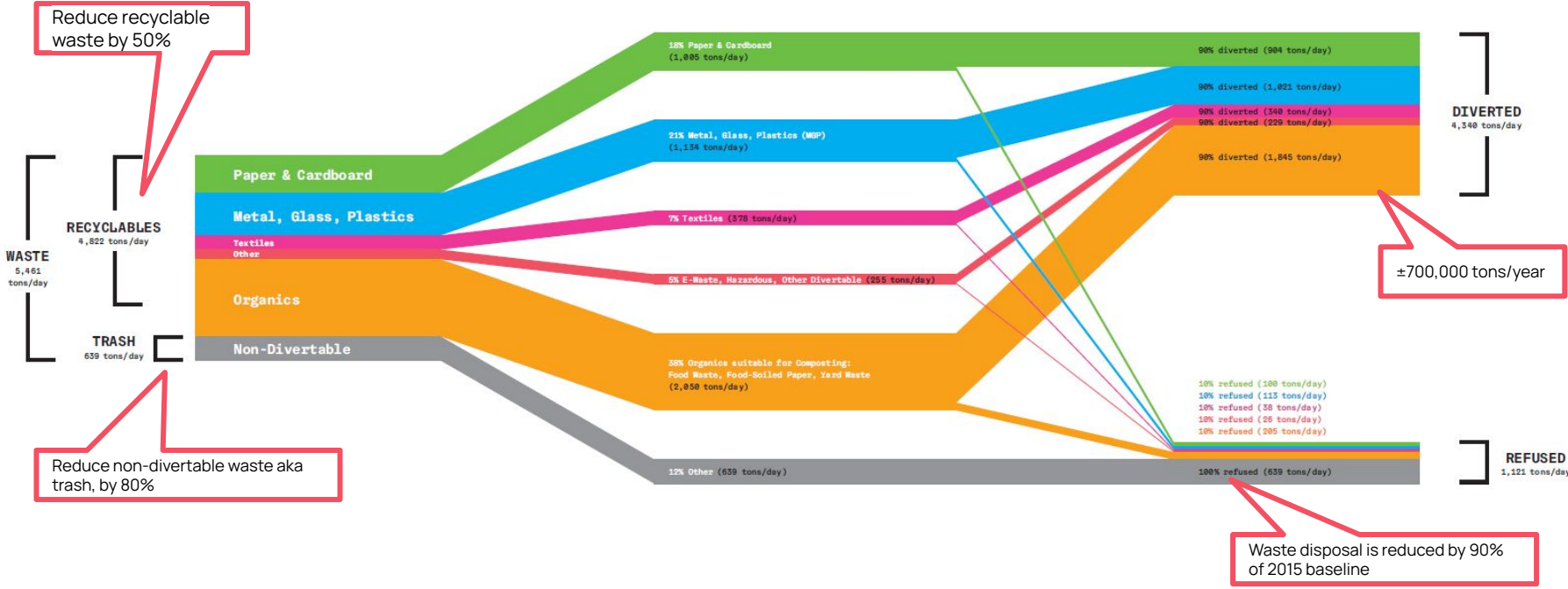
*Reducing wasted food, 2/3 of which is potentially edible, has the biggest carbon impact*

# NYC's Zero Waste Goal

**2015**



# 2030



# Issues to consider

## Collection

- Acceptable waste types
- Convenience
- Contamination reduction (*eg. through manned drop-offs or controlled access*)
- Engagement and education opportunities
- Participation
- Transport - distance and methods (*garbage truck / bike / electric vehicle*)

## Process

- Environmental justice issues (*mostly from trucks*)
- Scale, space requirements and siting issues
- Cost and speed of setting up facilities
- Co-location opportunities, eg
  - Wastewater treatment plants
  - Parks and greenspaces
- Jobs, volunteer and education opportunities

## Output

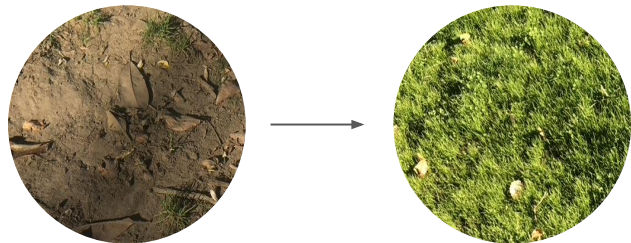
Is there beneficial use opportunities in NYC, or region?

- Compost
- Biogas
- Digestate



# How much need does NYC have for compost?

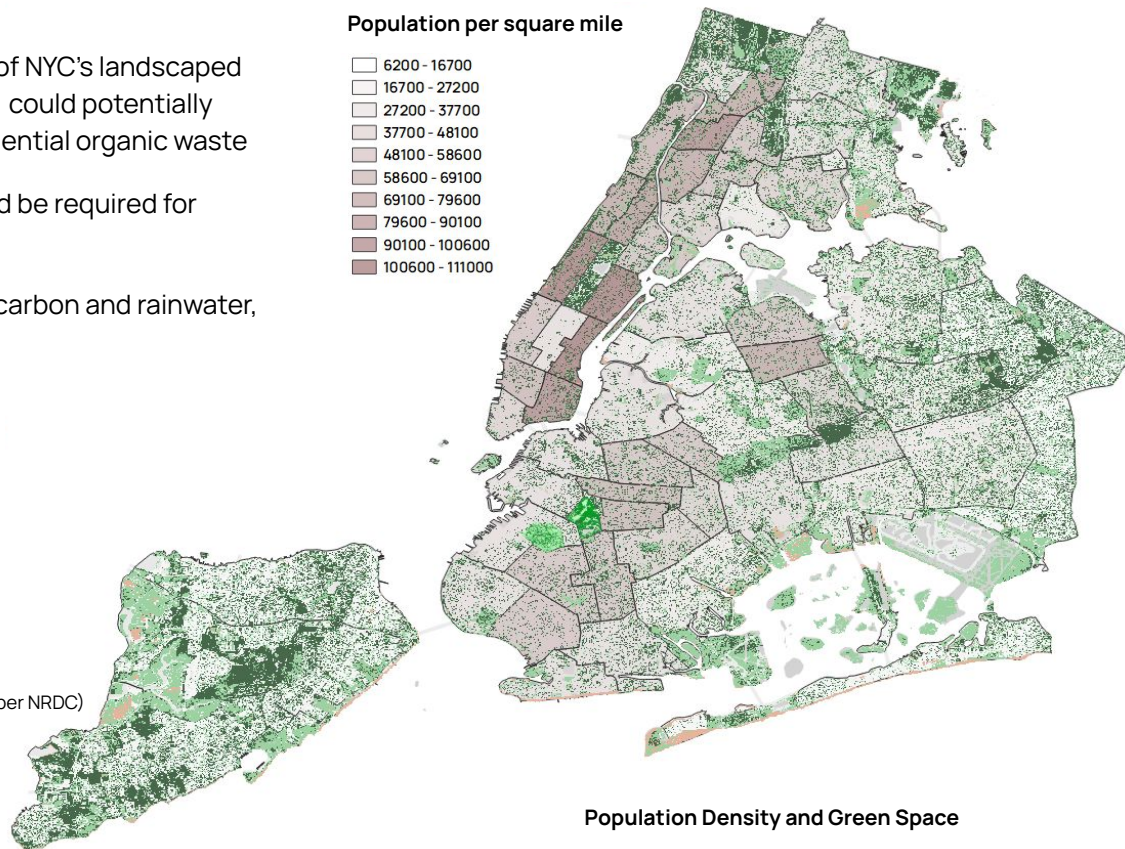
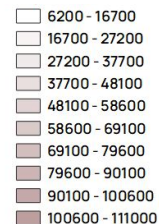
- If 1" of compost was applied each a year to 25% of NYC's landscaped areas (parks, street trees, gardens, cemeteries) could potentially use up all of the compost made from NYC's residential organic waste
- About one percent of the landscaped area would be required for composting operations
- This makes soils healthier, and they store more carbon and rainwater, reducing flooding and cooling the air



Assumptions, see [link](#)

- Food waste generation of 1.75 lbs / person / wk (50% reduction current per NRDC)
- Equal weight of food scraps : yard waste for composting
- 50% reduction in weight in compost process
- Compost application rate: 1"/year = 60 tons / acre or 2.8 lbs /SF
- ±30,000 acres of landscaped area in NYC
- 30 SF / ton-year compost facility footprint

Population per square mile



Population Density and Green Space

# Additional options



On-site collection, composting and use in gardens or urban farms, for example **home composting in back yards** or by **Compost Power at NYCHA** and many **Community Gardens**.

On-site composting of leaves and yard waste in parks, sometimes combined with food waste, eg at **Battery Park City**

Private micro-hauling services like **BK Rot, GreenFeen, Vokashi, or Groundcycle** that take residential and commercial food waste and typically process it in the City.

Equipment in buildings that can process food scraps by removing water - a **pulper** or convert to fertilizer - a **dry biodigester**





# Community Composting

Justin Green  
Executive Director, Big Reuse



# Guiding Principles of Community Composting

1. **Resources recovered:** Waste is reduced; food scraps and other organic materials are diverted from disposal and composted.
2. **Locally based and closed loop:** Organic materials are a community asset, and are generated and recycled into compost within the same neighborhood or community.
3. **Organic materials returned to soils:** Compost is used to enhance local soils, support local food production, and conserve natural ecology by improving soil structure and maintaining nutrients, carbon, and soil microorganisms.
4. **Community-scaled and diverse:** Composting infrastructure is diverse, distributed, and sustainable; systems are scaled to meet the needs of a self-defined community.
5. **Community engaged, empowered, and educated:** Compost programming engages and educates the community in food systems thinking, resource stewardship, or community sustainability, while providing solutions that empower individuals, businesses, and institutions to capture organic waste and retain it as a community resource.
6. **Community supported:** Aligns with community goals (such as healthy soils and healthy people) and is supported by the community it serves. The reverse is true, too; a community composting program supports community social, economic, and environmental well-being.

From Institute of Local Self Reliance

# NYC Compost Project

Funded by NYCsanitation



The NYC Compost Project, created by the NYC Department of Sanitation (DSNY) in 1993, works to rebuild NYC's soils by providing New Yorkers with the knowledge, skills, and opportunities they need to make and use compost locally





# Community Composting in NYC

DSNY NYC Compost Project, the sustainability organizations it funds, and many other community composters connected to the Compost Project have been critical partners in facilitating the behaviour change, education, and community outreach necessary to make composting accessible to a diversity of New Yorkers.

Changing the hearts, minds, and habits of New Yorkers and making compost cool is essential for the success of residential organic waste collection

For almost a decade efforts to launch a city wide composting programs have been stop-and-go, community composting efforts have worked to provide composting to New York City.

New York City's compost community includes close to 200 community gardens registered with NYC Parks, "micro haulers," and midscale composters that could scale because of funding from DSNY and space from the City.

paraphrased from "Creating careful circularities: Community composting in New York City" by Oona Morrow and Anna Davies

# Food Scrap Drop-offs



**Compost Project organizes, coordinates and pickups food scraps collected at nearly 200 community partner sites across New York City**

- Community Gardens
- Farmers Markets
- Community groups
- Libraries





























# Lower East Side Ecology Center

Lower East Side & Canarsie

In 1990 - Christine Datz-Romero and Clyde Romero converted 15,000 square feet of rubble-filled lots in the Lower East Side into a space for community composting. Union Square food scrap dropoff was one of few sites to compost waste in NYC.

**NYC**  
Compost Project

Funded by **NYC**sanitation





# Lower East Side Ecology Center

Lower East Side & Canarsie

1,332,786 lbs food scraps collected in 2022

Coordinates Master Composter Program with Botanical Gardens and others.

- 650 participants at the classroom sessions, field trips, and hands-on activities.

**NYC**  
Compost Project

Funded by **NYC**sanitation





# Earth Matters

## Compost Learning Center - Governor's Island

- 15,000 visitors and volunteers
- 66 apprentices and youth interns
- 700 tons composted and distributed with GreenThumb
- Zero Waste Island, Chickens and goats

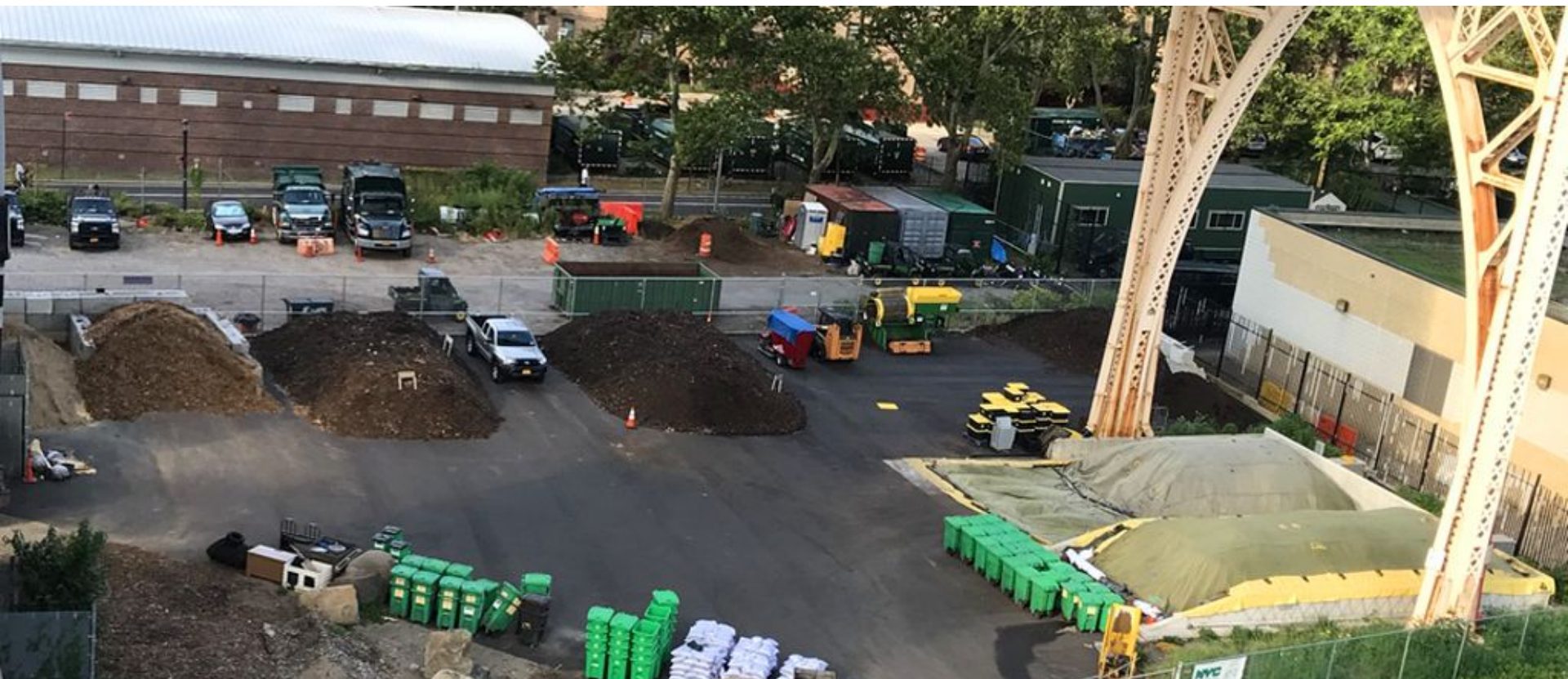




# Big Reuse - Queensbridge Community Compost

Long Island City, Queens, NY

1,200,000 lbs composted annually from Parks and residents





# Before - Site used as dump by contractor





# Salt Lot Community Compost Site hosted by Big Reuse

Gowanus, Brooklyn

600,000 lbs composted annually

**NYC**  
Compost Project  
Funded by **NYC** sanitation

Hosted by  
**BIG**  
REUSE

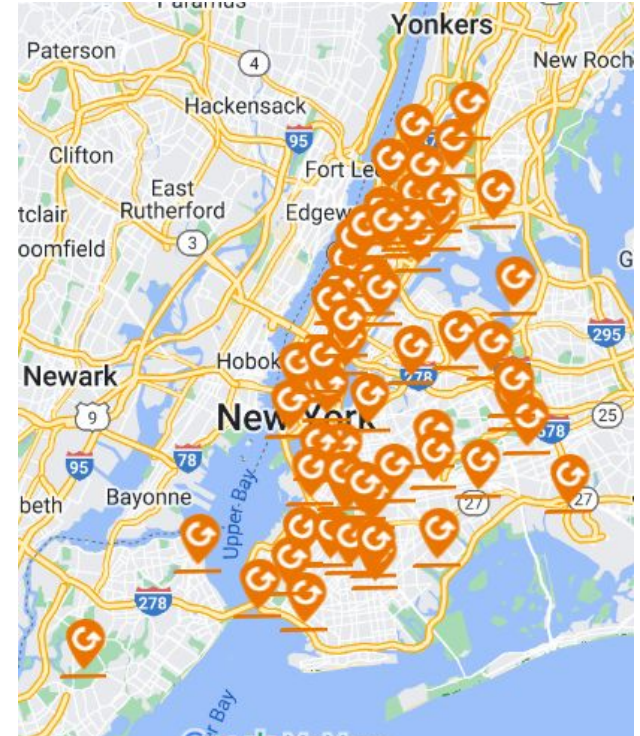




# GrowNYC

Part of a larger network of over 200 Food Scrap Drop-off sites in NYC  
GrowNYC Compost Program currently operates 56 food scrap drop-off sites

- 7,000 regular weekly participants
- Diverting over 25 tons of food scraps from landfills each week
- Composted at Earth Matter, Big Reuse, Fresh Kills and AD





# Red Hook Compost Initiative

- Largest human powered composting site in US
- Providing compost to as part of Red Hook Community Farm
- On Parks land
- 1,000+ volunteers each year
- Processes over 225 tons/year of organic material

**NYC**  
Compost Project

Financed by **NYC** sanitation





# BK Rot

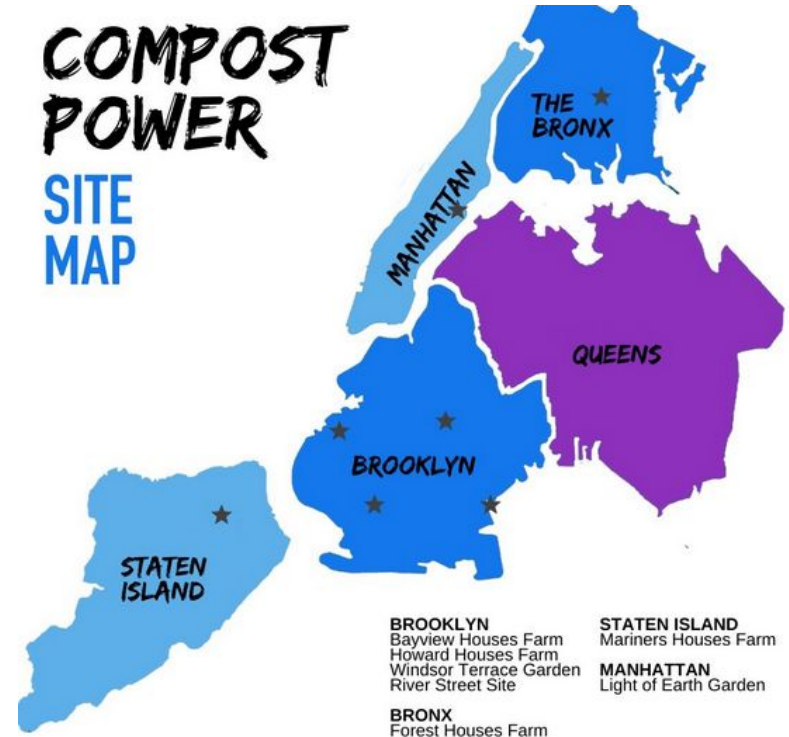
- Independent from NYC Compost Project
- POC Youth employment social enterprise
- Bike powered
- Composting 100 tons a year





# Compost Power

- Independent from NYC Compost Project
- Social enterprise founded by Domingo Morales
- Mission to build out sustainable community compost sites across NYC with an emphasis on 'Underserved and marginalized' communities.
- Design and build community compost sites.





# Free compost for public use!

Hundreds of groups annually:

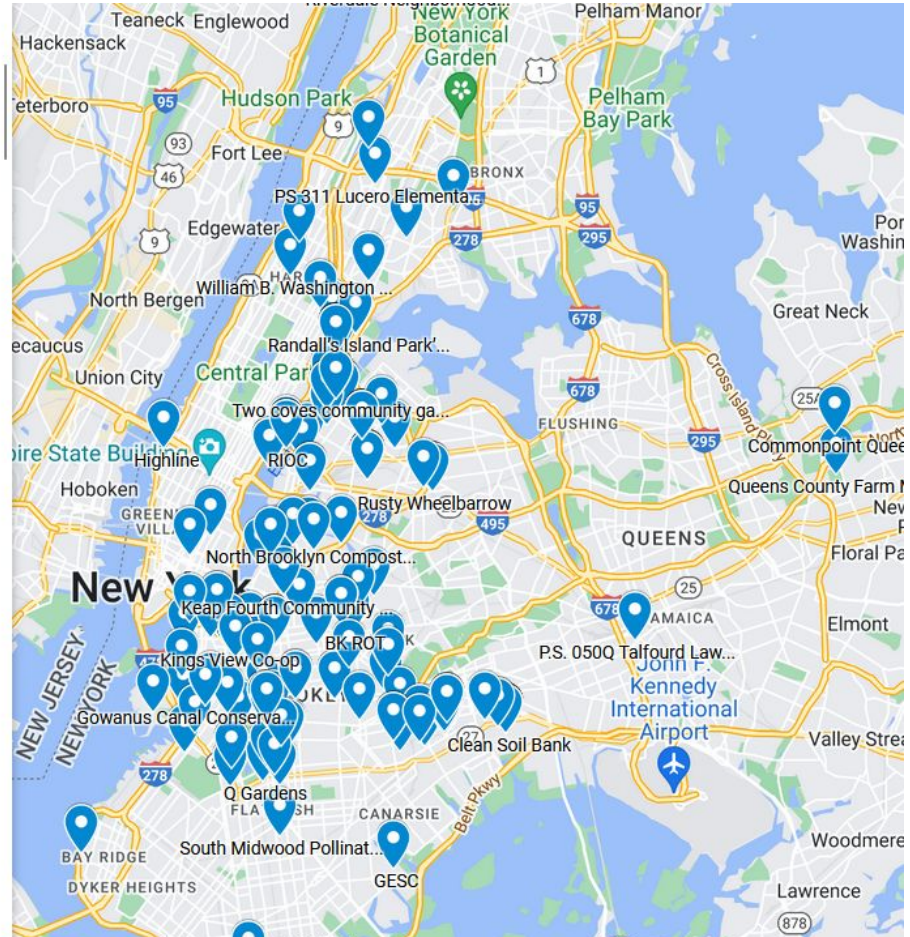
- NYC Parks
- Community Gardens
- Street Tree Stewards
- Schoolyard gardens





# Compost Distribution - Big Reuse

- 📍 Clean Soil Bank
- 📍 Gowanus Canal Conservancy
- 📍 Abib Newborn Garden
- 📍 Ravenswood (Debbie's Garden)
- 📍 Astoria Pug - Most Precious Blood
- 📍 Jacob A. Riis Neighborhood Settlement
- 📍 Kings View Co-op
- 📍 Imani Garden
- 📍 Rusty Wheelbarrow
- 📍 Ravenswood (Debbie's Garden)
- 📍 Fort Greene Park
- 📍 Socrates Sculpture Park
- 📍 Highline
- 📍 Roosevelt Island
- 📍 ENYF
- 📍 Socrates Sculpture Park
- 📍 Myrtle Village Green Community Garden
- 📍 Q Gardens





# Street Tree Compost Application





# Onsite Community Engagement

**NYC**  
Compost Project  
Funded by **NYC**sanitation

Hosted by  
**BIG**  
REUSE



# Master Composter Course

To be certified as an NYC Master Composter, applicants need to complete:

- All seven (7) course workshops
- Two (2) official field trips
- Thirty (30) hours of approved compost-related volunteering

Offered by LESEC, QBG, NYBG, BBG, Snug Harbor through DSNY Compost Project.

# MASTER COMPOSTER CERTIFICATE COURSE





# FY23 Curbside Composting Outreach

18 outreach staff including 8 PT per diem

Canvassing with passionate, knowledgeable multilingual staff

Over 56,000 outreach interactions - FYTD

414 events - FYTD

32,417 doors knocked

## 7 Languages Spoken:

- 9 Spanish speakers
- 4 Chinese speakers
- 2 Korean speakers
- 1 Japanese speaker
- 1 Arabic speaker
- 1 Croatian, Bosnian, Serbian speaker



# Centralized Composting Methods & Systems



**US** Composting  
Council®

**Frank Franciosi-Executive Director**





**US** Composting  
Council®

## Established 1990

The US Composting Council is a trade and professional association advancing compost manufacturing, compost utilization, and organics recycling to benefit our members, society, and the environment.

**Compost: Nature's Way To Grow!**



**US** Composting  
Council®

## **Our Mission**

The US Composting Council advances compost manufacturing, compost utilization, and organics recycling to benefit our members, society, and the environment.

## **Our Vision**

We believe compost manufacturing and compost utilization are central to creating healthy soils, clean air and water, a stable climate, and a **regenerative** society.





**ReFED**



United States  
Department of  
Agriculture



Food and Agriculture  
Organization of the  
United Nations



## INTERNATIONAL & NATIONAL DRIVERS

- **Reducing Food waste 20% over a 10 year period would yield \$100 billion in societal economic value\***
- **Sustainable Development Goal 12.3 call on all nations to cut food waste in half by 2030\*\***
- **USDA & EPA 2030 Goal**

• **\*2018 Food Waste Investment Report**

• **\*\*UN Food and Agriculture Organization**



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Council®



**ReFED**

Rethink Food Waste  
*Through Economics and Data*

### Composting:

By investing in **composting** infrastructure, training, and policy, 5.3 million tons of food scraps can be diverted annually from landfills through **composting**, reducing an estimated 2.6 million tons in greenhouse gases while creating over 9,000 new jobs.



## NATIONAL DRIVERS



**US** Composting  
Council®



# Composting Scale

## Centralized Composting (Medium – Large Scale)

- Can be private or public. Usually within a 50 miles radius of a metropolitan area. Volume can be from **25,000–200,000 tons per year**.



OCCRA NY State



Cedar Grove Compost Seattle, WA



US Composting Council®

# Composting Methods

## Static Pile

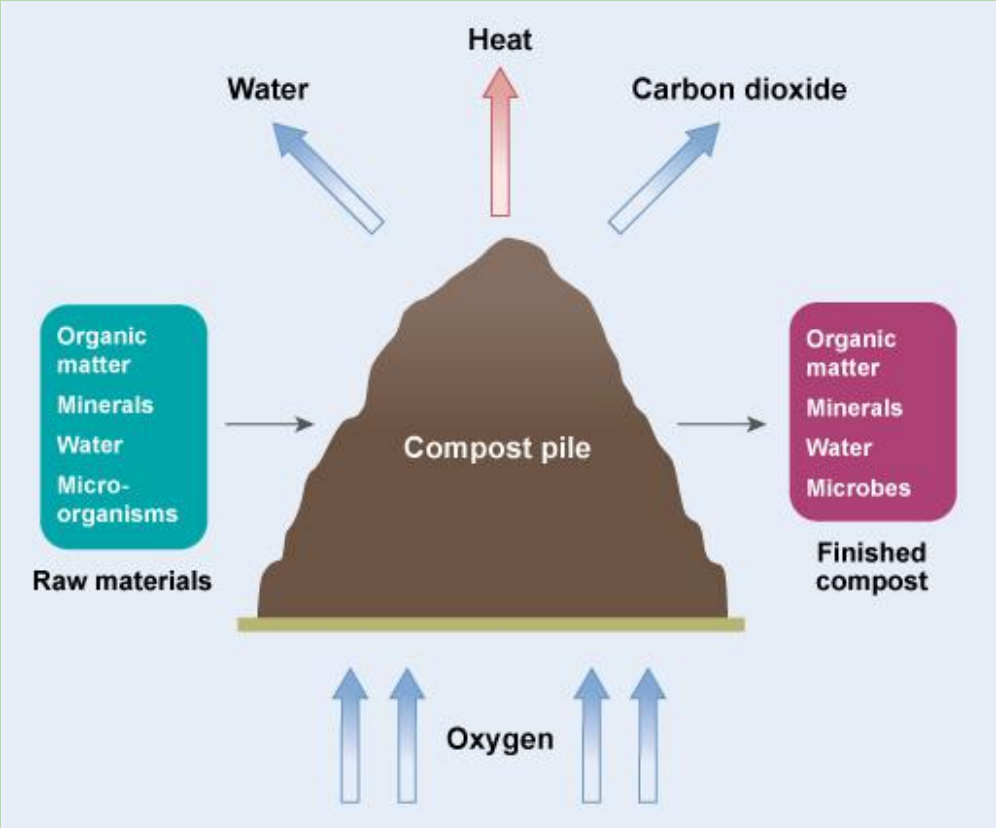


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# Composting Methods

## Static Piles



# Composting Methods

## Turned Window



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# Composting Methods

## Turned Windrow



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# Composting Methods

## Aerated Static Pile



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# Composting Methods

## Aerated Static Pile



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# Composting Methods

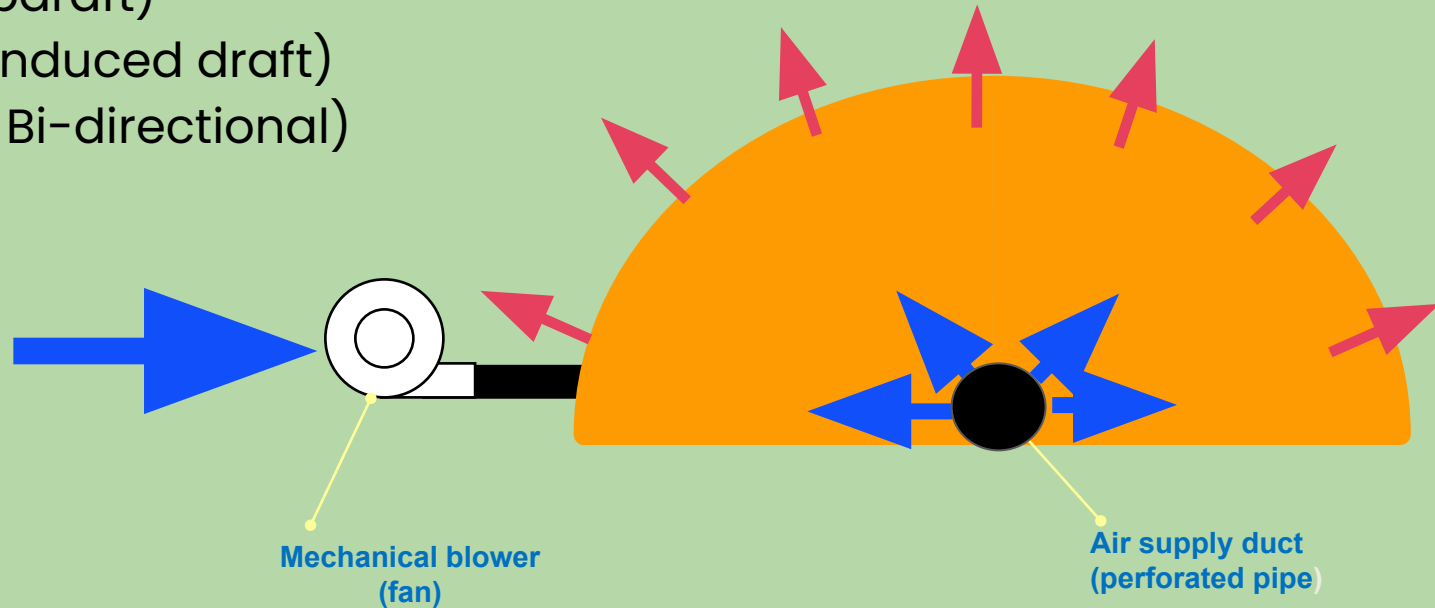
## Forced Aeration

### Active aeration

#### Covered or uncovered

- Positive (or Updraft)
- Negative (or induced draft)
- Reversing (or Bi-directional)

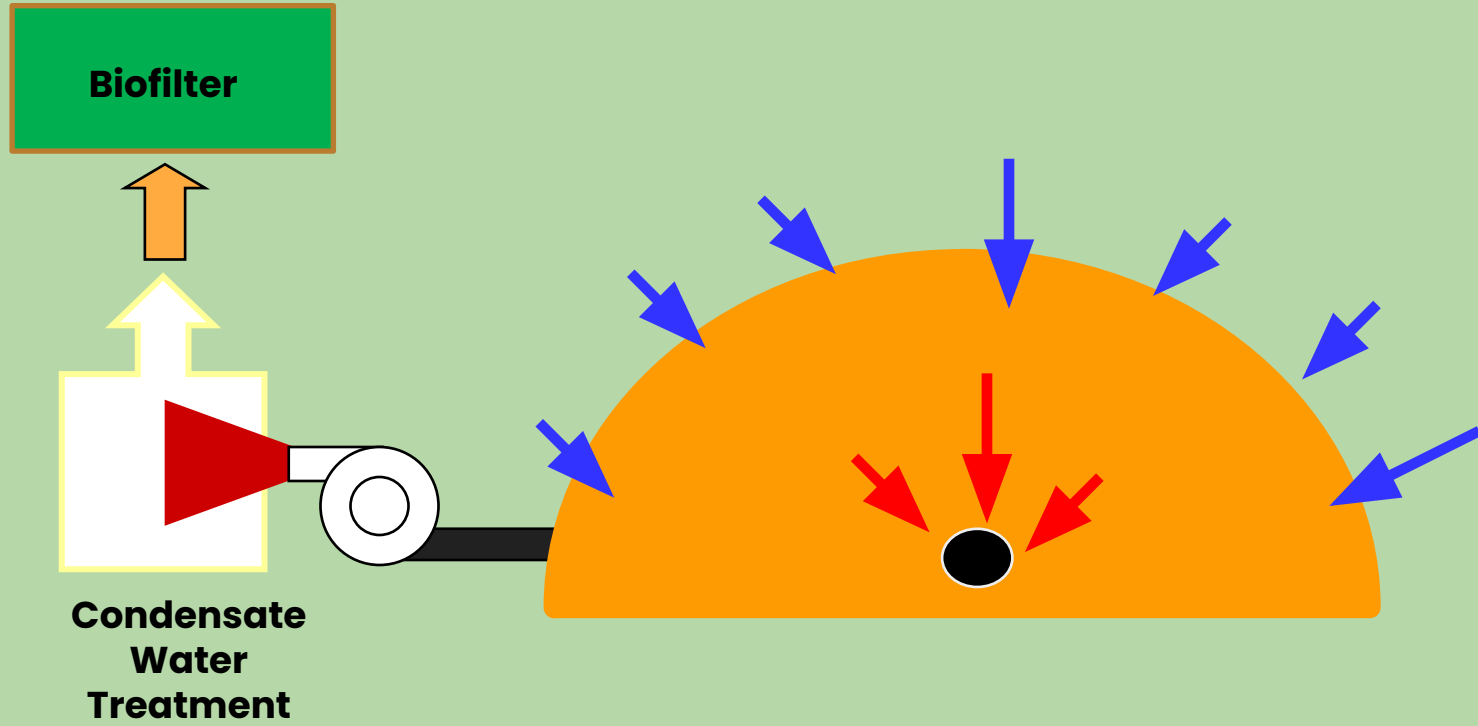
## Positive Aeration



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# Forced Aeration - Negative



# Compost Covers





# Biofilter – Odor Control



# Composting Methods

## Turned Aerated Pile



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# Composting Methods

## Turned Aerated Pile



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# Composting Methods

## In-vessel

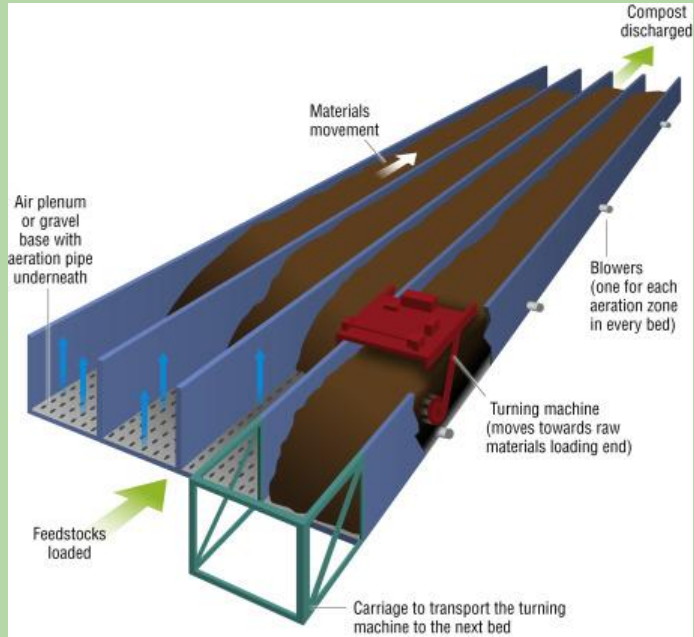


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# Composting Methods

## Aerated Agitated Bay



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## COMPOST PRODUCT

- Improving soil quality
- Reducing soil erosion
- Sequestering carbon
- Managing stormwater flow
- Increasing infiltration
- Benefits both ag and urban soils
- Standards in development
- Aids in City Climate Resiliency



US Composting Council®



# A Landscape Design Approach to Climate Change Resilience

## Energy Conservation

Green and biodiverse roofs can improve energy efficiency of buildings by reducing the heating and cooling needs



## Natural Play

Native planting and natural play enable children to interact with nature and develop their environmental awareness



Arc promote an 'Environment First' approach to place making. We address the challenges of climate change through multi-functional landscape design, mindful of resources, resulting in well designed and resilient places.

## Edible Gardens

Planting edible species such as herbs, of fruiting trees and enabling community gardens promote healthy living

## Air Quality Improvements

Street tree and hedge planting absorbs pollutants, filters particles and helps mitigate the effects of 'urban heat islands'

## Shade and Cooling

Tree planting and planted areas assists in climate mitigation through cooling which reduces the urban heat island effect and making places comfortable to be in

## Habitat Creation

Planting and habitat creation can contribute to delivering biodiversity net gain. Careful selection will provide food and shelter for a range of species and promote pollination



## Health and Wellbeing

Well designed outdoor spaces with accessible activities for everyone and access to nature are proven to benefit physical and mental health and wellbeing

## Reduce Flood Risk

A multi-functional approach to public realm design through water sensitive design including sustainable drainage, street tree planting will reduce the risk of flooding, improve water quality and assist in promoting biodiversity

arc



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# Compost: Nature's Way To Grow!



[compostingcouncil.org](http://compostingcouncil.org)

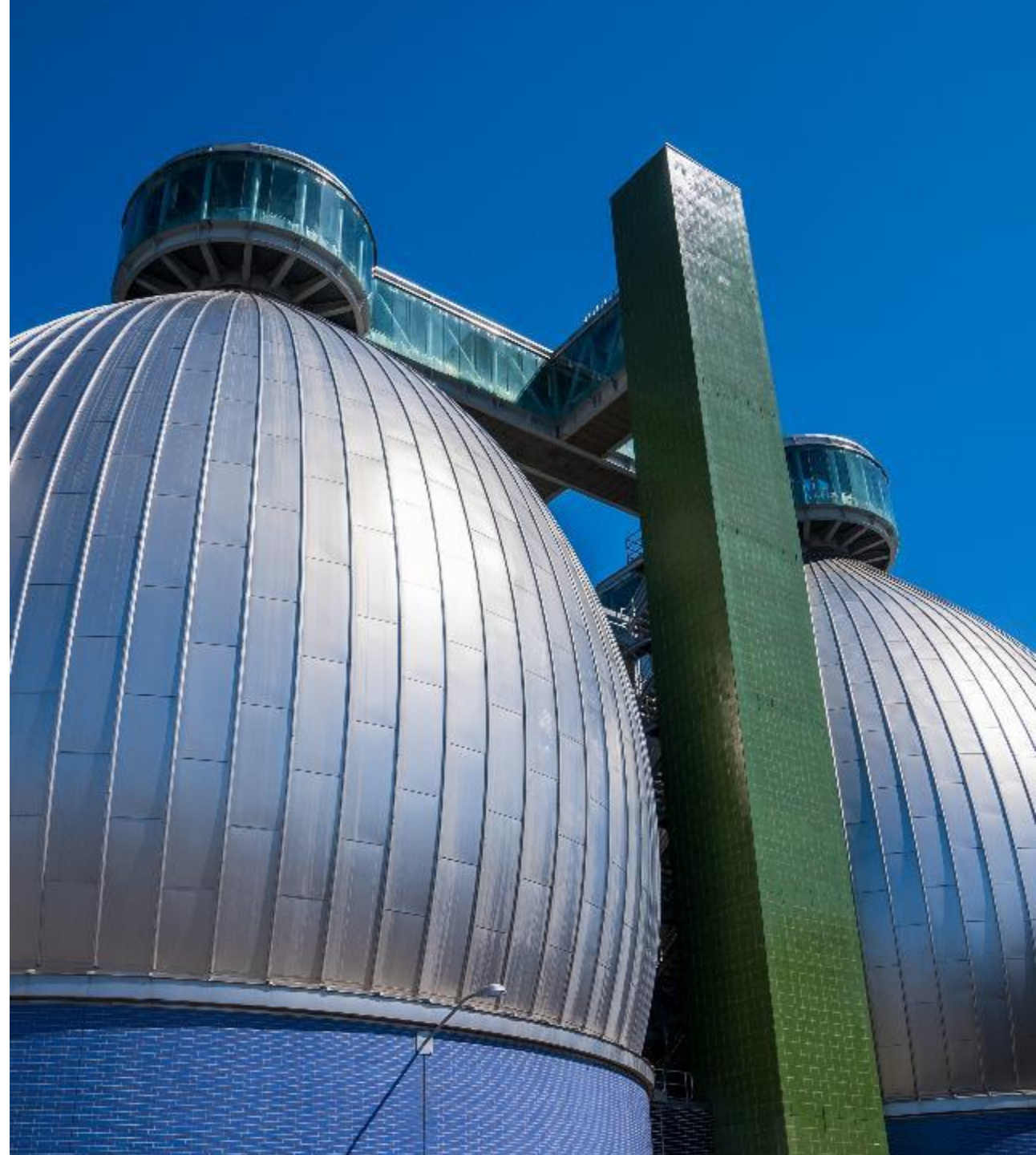
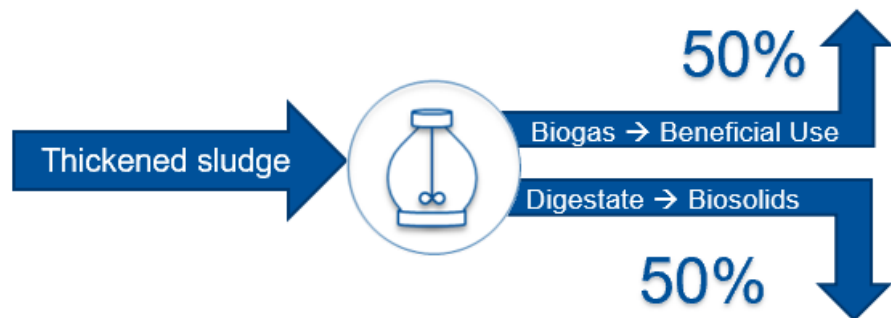


# Co-digestion in NYC

June 12, 2023

# Anaerobic Digestion

- Anaerobic digestion of sludge is an integral step in DEP's treatment process
  - Reduces mass of solids exported from plant by ~50%
  - Breaks down organic material into biogas
  - Produces stabilized biosolids
- Self-contained process, resulting in fewer emissions and increases potential for additional resource recovery





# Anaerobic Digestion at DEP

- DEP has 75 digesters across all 5 boroughs
- Decades of experience handling large organic waste streams

Wastewater Treatment Plants		
Area No.	Borough	Rated Cap
		MGD
①★ ②	Manhattan Wards Island North River	275
		170
③★	Bronx Hunts Point	200
④★ ⑤★ ⑥★ ⑦★ ⑧	Brooklyn Newtown Creek 26th Ward Coney Island Red Hook Owls Head	310
		85
		110
		60
		120
⑨★ ⑩★ ⑪★ ⑫★	Queens Tallman Island Jamaica Bowery Bay Rockaway	80
		100
		150
		45
⑬★ ⑭★	Staten Island Port Richmond Oakwood Beach	60
		40
<b>Total</b>		<b>1805</b>



**LEGEND**

- ① WWTP
- Service Area Boundary
- ★ BNR, Current or Future Operations
- Plant has Dewatering

# Organics Co-Digestion at Newtown Creek WRRF

1. Source-separated organics are collected by DSNY and commercial haulers
2. Waste Management pre-processes food waste into a slurry off-site
3. Slurry is delivered to DEP's digesters at a feed-in station

## Source Separation + Collection



## Off-Site Pre-Processing



## Transport + Storage + Co-digestion



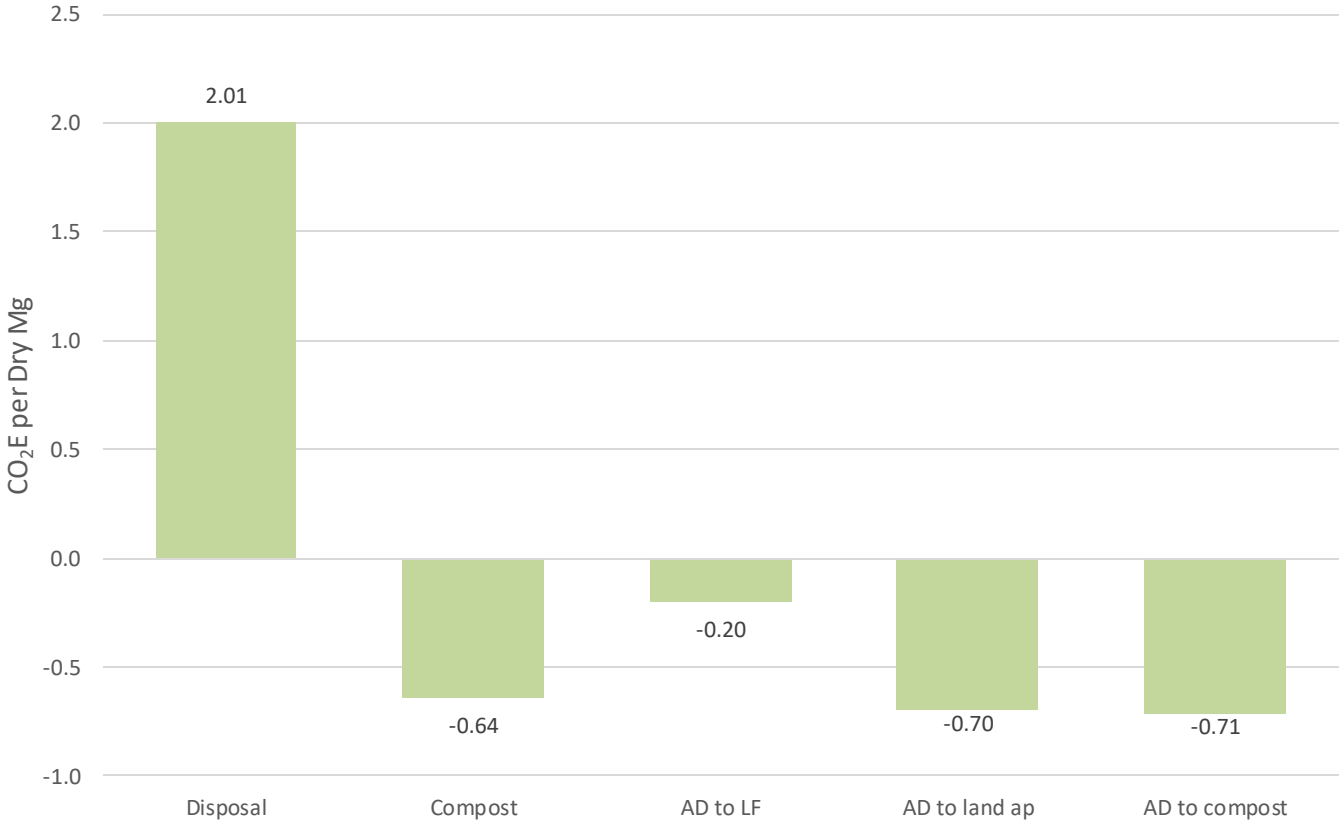


# Why Co-digest?

Issue in Organics Recycling	Solution via Co-digestion
High contamination rate in Source Separated Organics (SSO)	Liquid-phase co-digestion pre-processing very effective at removing contamination
FOG/Meat/Dairy not accepted at compost facilities	Compatible with digestion; FOG in particular has high energy content and biogas yield
Compost facilities require large footprint relative to throughput	Anaerobic processes are more vertical and occupy smaller footprints
Supply should not exceed demand	Co-digestion facilitates creating a range of bioproducts that can offset the use of less sustainable products on the market

# Carbon Footprint of AD is Comparable to Composting

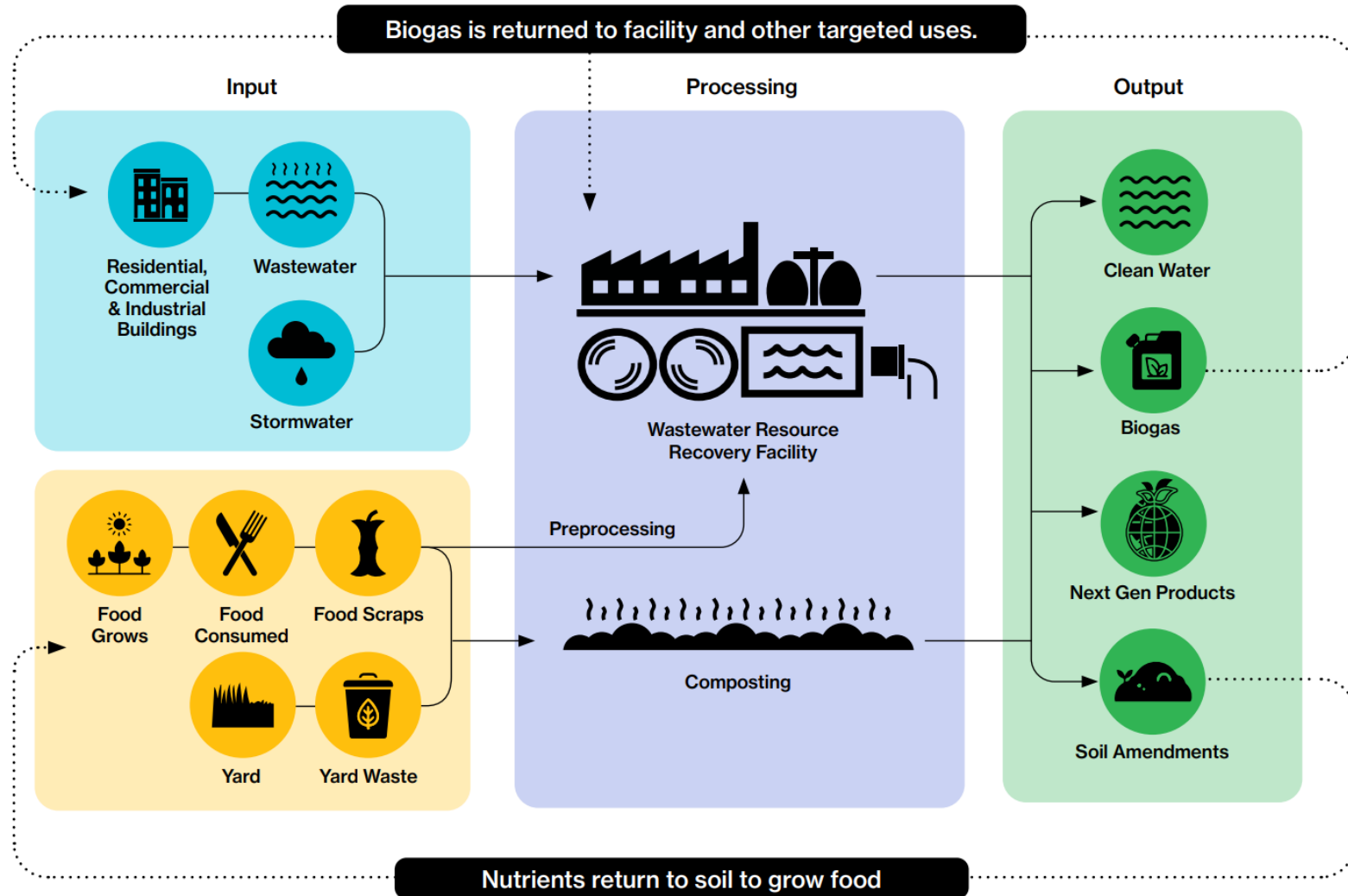
Net Emissions per Dry Mg of SSO



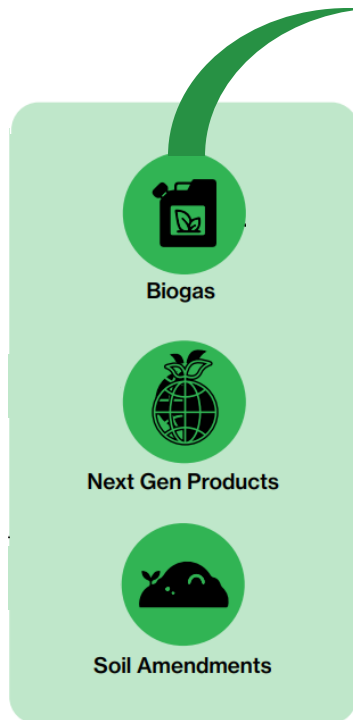
Source: Northern Tilth, 2023



# New York City's Organics Circular Economy

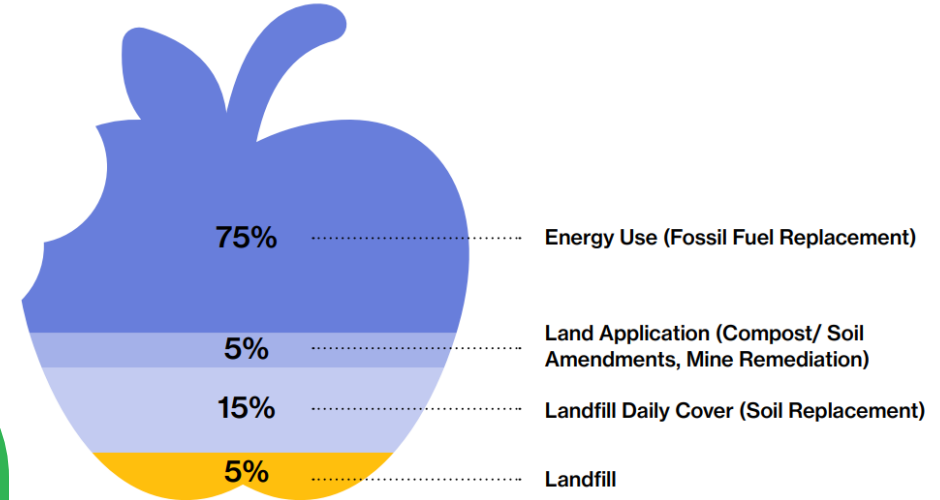


# Beneficial Use of Co-digestion Products

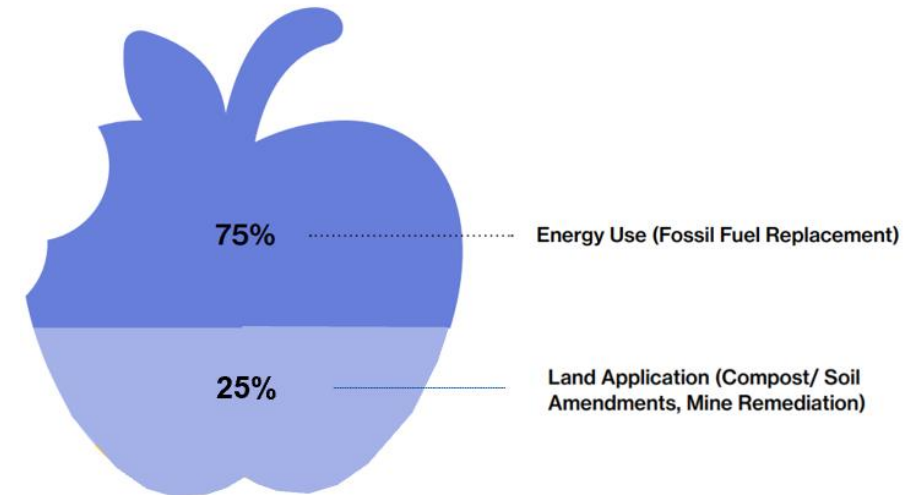


## BIOGAS

- Many uses for biogas on-site and off-site
- Pursuing highest and best use at each WRRF
- ECN Study indicates export of biogas to directly offset community use of natural gas has best overall environmental impact
  - Targeted to users with high temperature needs that will be most difficult to electrify



Co-digested organics at NC in 2023



Co-digested organics at HP in 2026

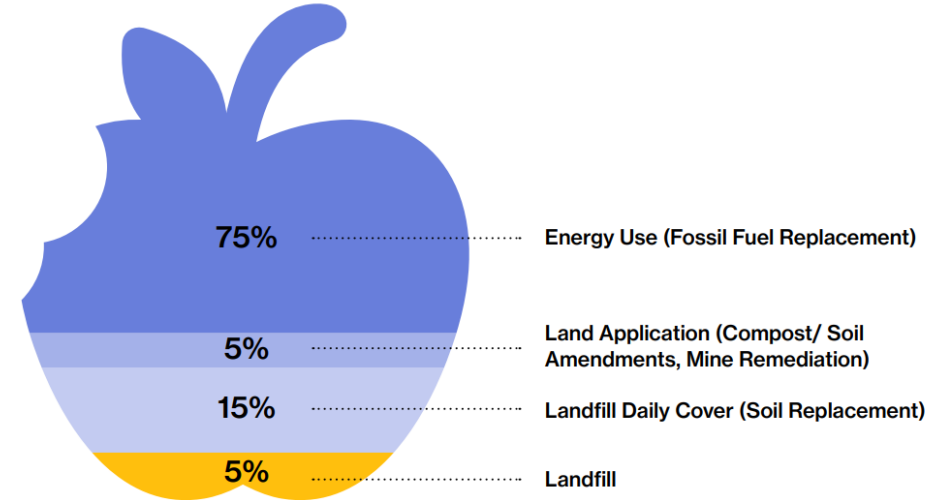


# Beneficial Use of Co-digestion Products

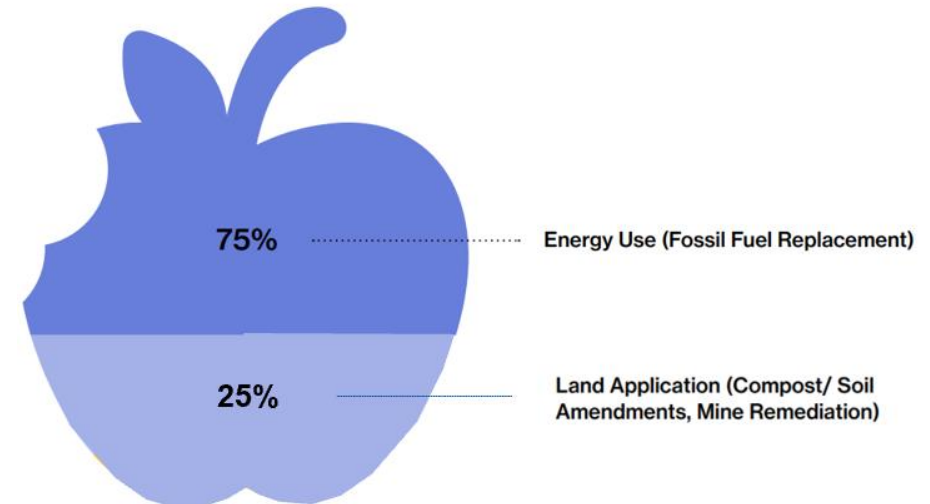


## BIOSOLIDS

- Highest and best use focused on nutrient recycling
  - Compost
  - Dried or pelletized soil amendments
  - Lime stabilization
- Application sites
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  - Agriculture
  - Mine reclamation/ecosystem restoration



Co-digested organics at NC in 2023



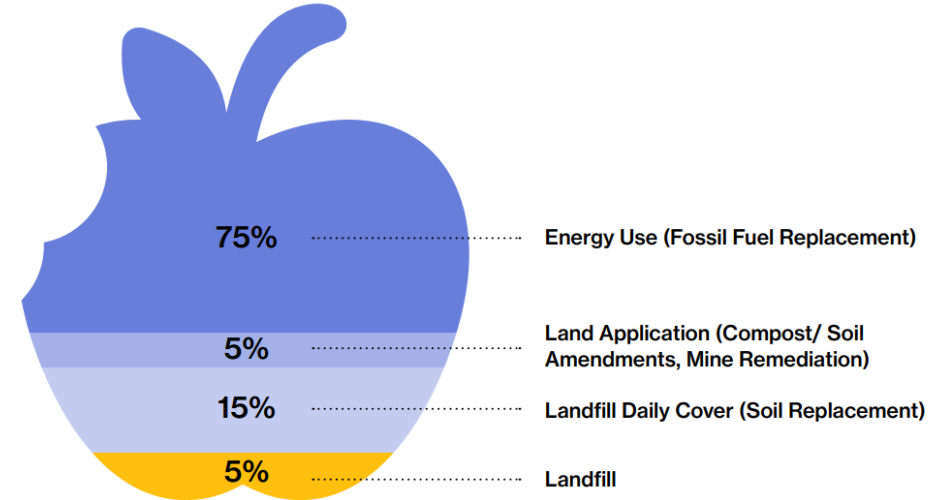
Co-digested organics at HP in 2026

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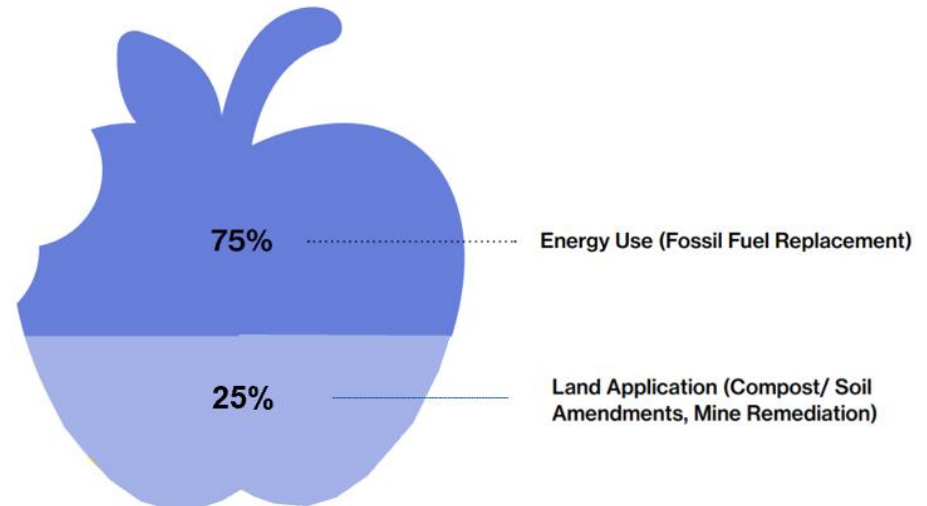


## NEXT GEN PRODUCTS

- Hydrogen production
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- Readily biodegradable bioplastics
- Biochar
- Ammonia Recovery
- Phosphorus Recovery
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Wastewater Treatment Plants		
Area No.	Borough	Rated Cap
		MGD
①★	Manhattan Wards Island North River	275
		170
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		85
		110
		120
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		100
		150
⑬ ⑭	Staten Island Port Richmond Oakwood Beach	60
		40
<b>Total</b>		<b>1805</b>



# Citywide Organics Study

## Comprehensive and Integrated Planning

- Groundbreaking holistic study of all of NYC's organic waste streams
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**Stakeholder Engagement** - Ensure that Environmental Justice considerations are included in both stakeholder engagement and in facility siting recommendations



*The Earth Matter Compost Learning Center on Governors Island Photo credit: The Compostess*



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*Granite Fuel RNG Upgrading Skid  
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# Thank You!



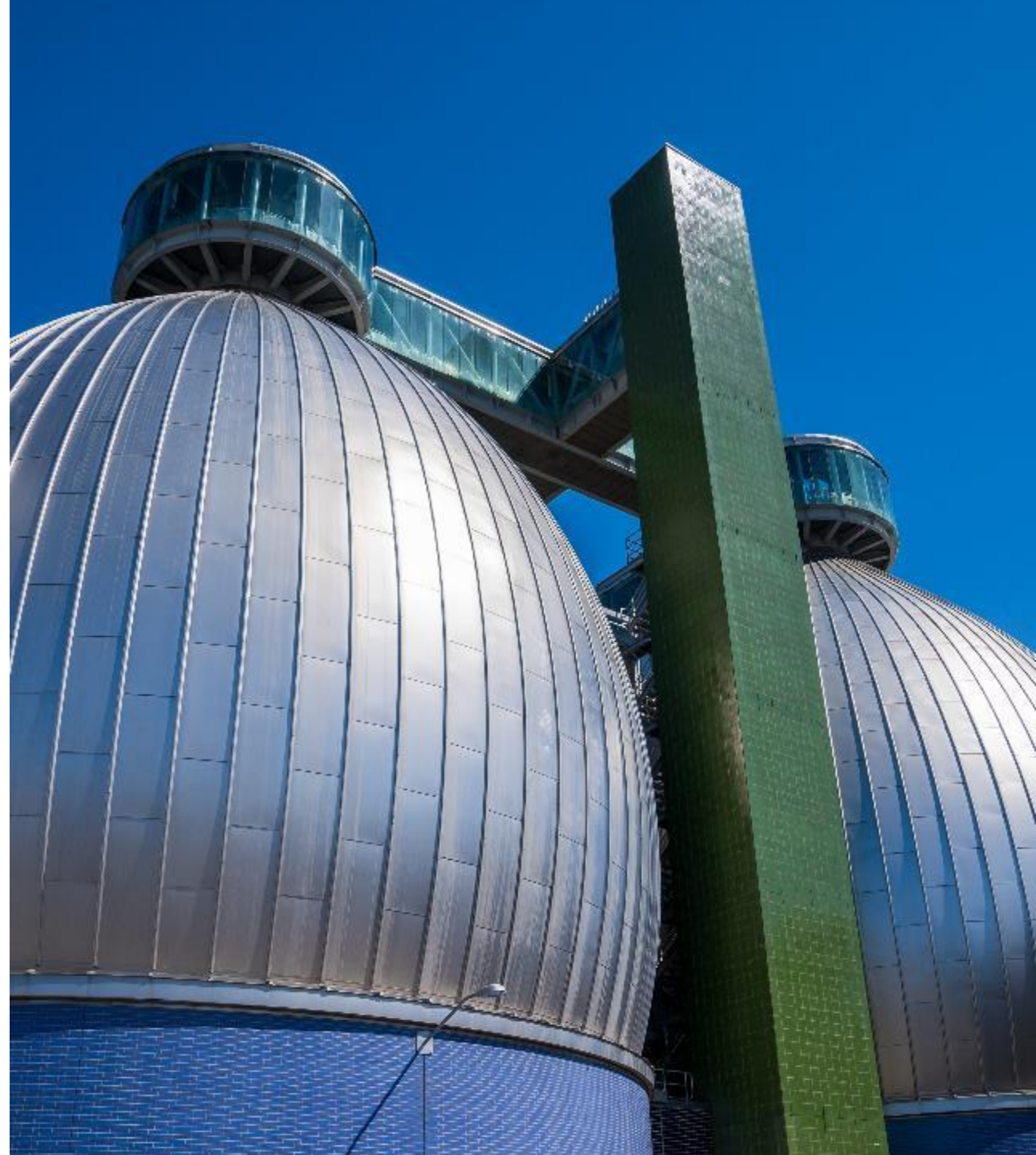
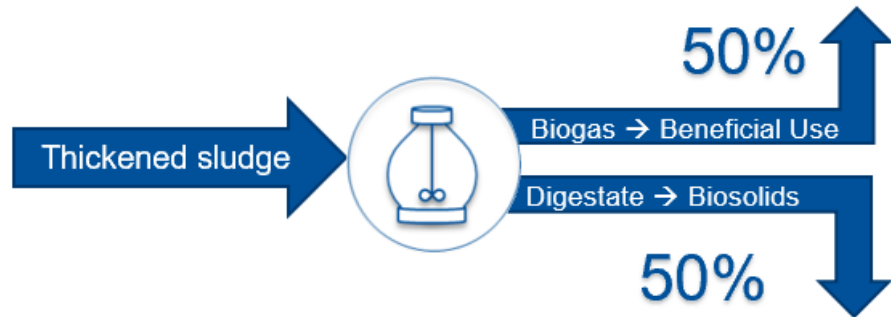
# Co-digestion in NYC

June 12, 2023



# Anaerobic Digestion

- Anaerobic digestion of sludge is an integral step in DEP's treatment process
  - Reduces mass of solids exported from plant by ~50%
  - Breaks down organic material into biogas
  - Produces stabilized biosolids
- Self-contained process, resulting in fewer emissions and increases potential for additional resource recovery



# Anaerobic Digestion at DEP

- DEP has 75 digesters across all 5 boroughs
- Decades of experience handling large organic waste streams

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**LEGEND**

- ① WWTP
- Service Area Boundary
- ★ BNR, Current or Future Operations
- Plant has Dewatering



# Organics Co-Digestion at Newtown Creek WRRF

1. Source-separated organics are collected by DSNY and commercial haulers
2. Waste Management pre-processes food waste into a slurry off-site
3. Slurry is delivered to DEP's digesters at a feed-in station

## Source Separation + Collection



## Off-Site Pre-Processing



## Transport + Storage + Co-digestion



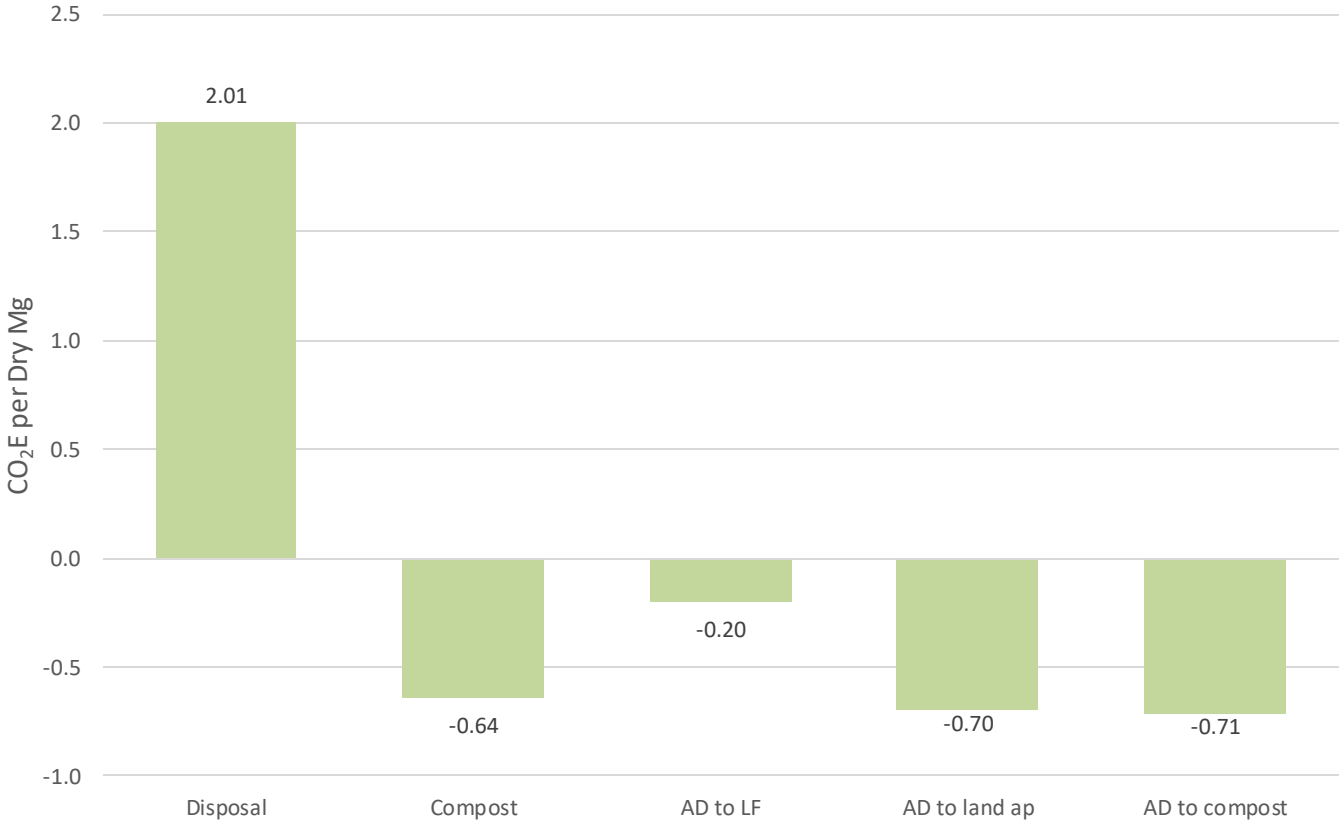


# Why Co-digest?

Issue in Organics Recycling	Solution via Co-digestion
High contamination rate in Source Separated Organics (SSO)	Liquid-phase co-digestion pre-processing very effective at removing contamination
FOG/Meat/Dairy not accepted at compost facilities	Compatible with digestion; FOG in particular has high energy content and biogas yield
Compost facilities require large footprint relative to throughput	Anaerobic processes are more vertical and occupy smaller footprints
Supply should not exceed demand	Co-digestion facilitates creating a range of bioproducts that can offset the use of less sustainable products on the market

# Carbon Footprint of AD is Comparable to Composting

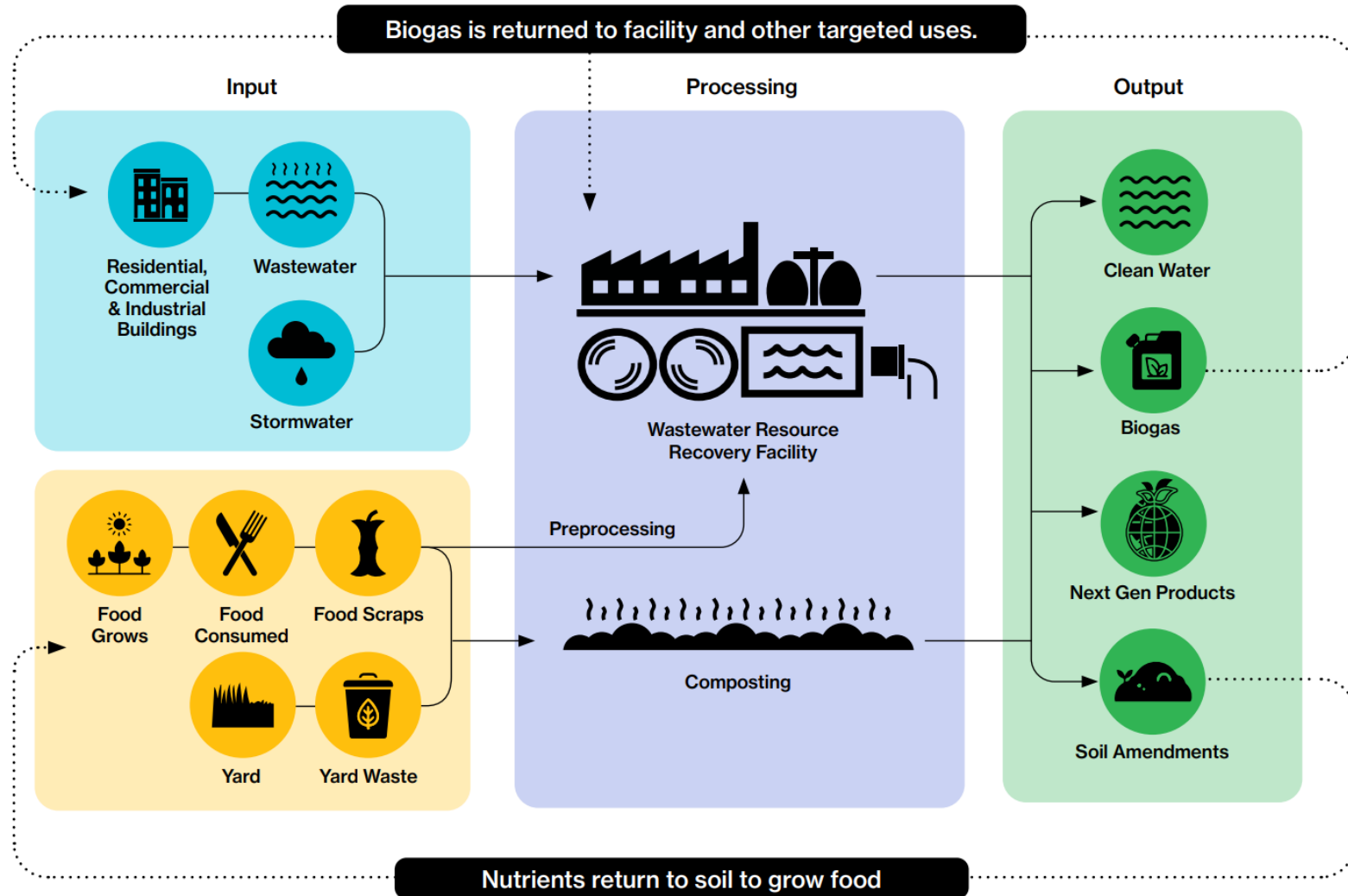
Net Emissions per Dry Mg of SSO



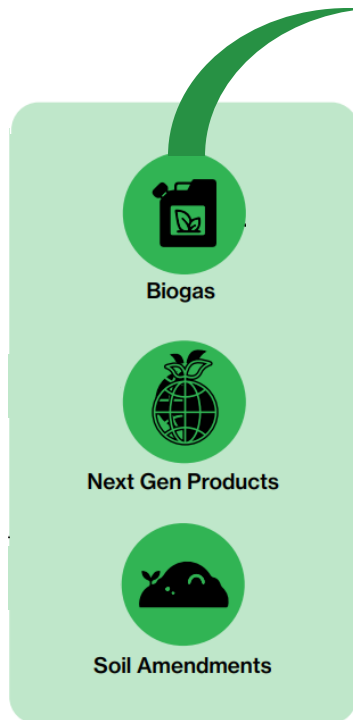
Source: Northern Tilth, 2023



# New York City's Organics Circular Economy

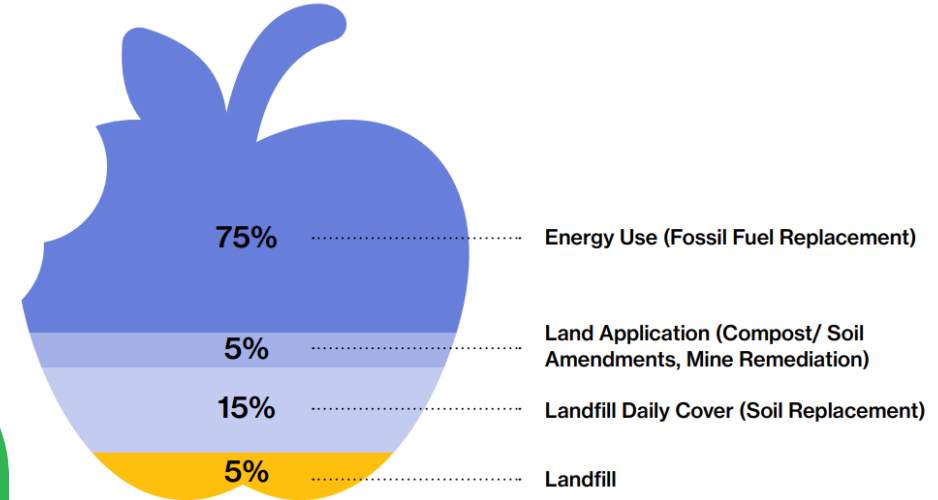


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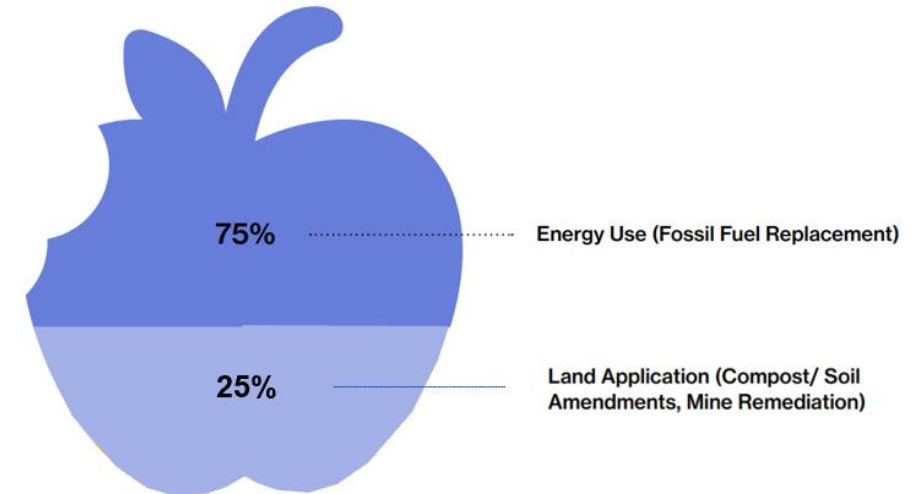


## BIOGAS

- Many uses for biogas on-site and off-site
- Pursuing highest and best use at each WRRF
- ECN Study indicates export of biogas to directly offset community use of natural gas has best overall environmental impact
  - Targeted to users with high temperature needs that will be most difficult to electrify



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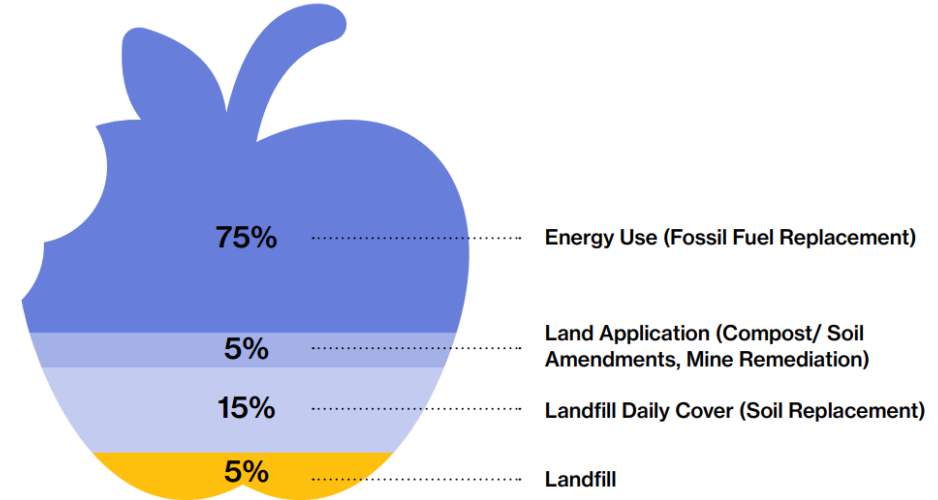
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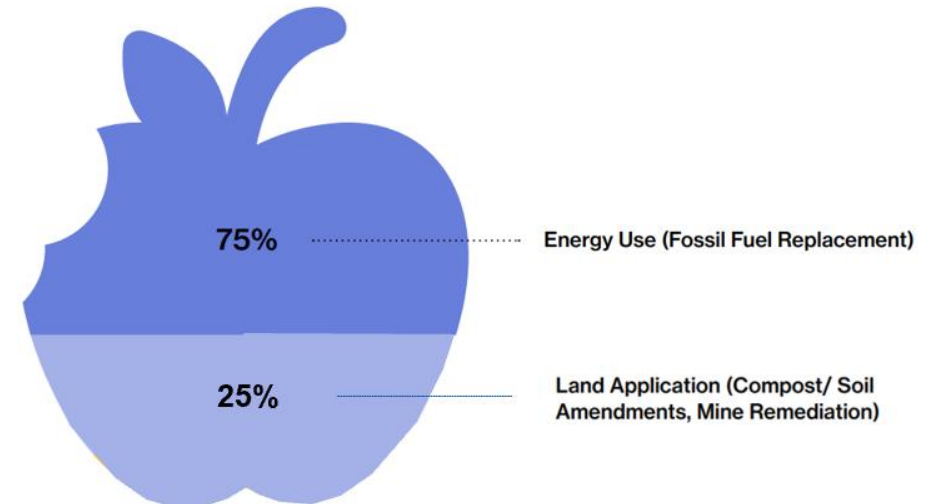


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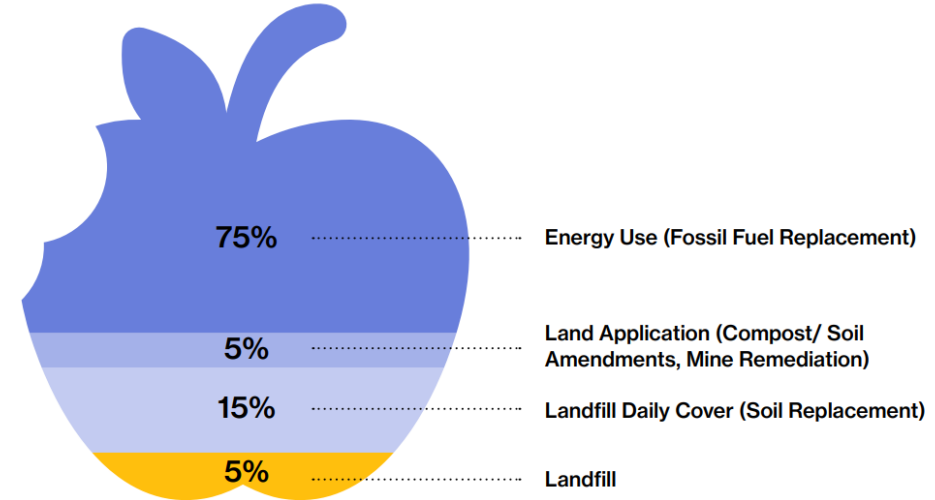


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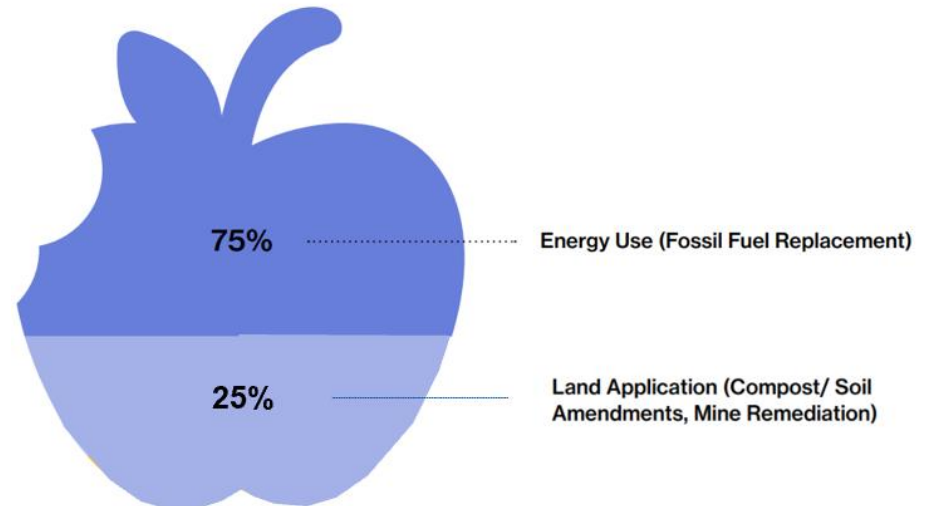


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