GLOBAL GREEN USA®

REGIONAL FOOD WASTE RECOVERY OUTLOOK

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Global Green's Food Waste Recovery Series

ACKNOWEDGMENTS

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New Jersey Department of Environmental Protection
New York City Department of Sanitation
Connecticut Department of Energy & Environmental Protection
New York State Department of Environmental Conservation
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About Global Green USA:

Global Green USA is dedicated to helping the places, the people, and the planet in need through catalytic projects, transformative policy, and cutting-edge research. Global Green USA's signature programs include greening affordable housing, schools, neighborhoods, and cities. Global Green USA's Coalition for Resource Recovery helps generate value by transforming waste into assets. The Coalition identifies and promotes effective waste diversion technologies and programs through the conducting of pilots and related research.

EXECUTIVE SUMMARY

In December of 2013, New York City Council passed a historic bill mandating that large generators of food scraps within New York City must implement a recovery system for organic wastes.

Mandates such as this are designed to facilitate development of new infrastructure for food scrap processing and recovery by ensuring that facilities will have access to food scraps as a feedstock for making a variety of products, including soil amendments, compost, and energy. The passage of this law creates a significant opportunity to make the switch from investing resources in polluting assets toward those that support a cleaner, circular economy.

This report serves as a status update concerning the existent and developing processing infrastructure for the food scraps in the New York City metropolitan region that this law requires to be diverted. We catalogue the infrastructure that currently supports food waste recovery, then explore markets for products made from food waste and ways to enhance these markets, and lastly identify several examples of food waste recovery systems in other cities, states, and regions that may serve as a model for further improvements in the tri-state area (New York, Connecticut, and New Jersey). Seven existing food waste processing facilities within the tri-state area are identified and discussed, as well as nine that are currently under development. As a result of these new facilities and others becoming operational, the food waste processing capacity in the region is expected to expand significantly relative to the current capacity.

While the food scrap recovery mandate was an important step toward supporting new facilities, several obstacles to the development of food waste infrastructure in the region still exist, including: barriers to vital long-term contracts between large commercial sector food waste generators and processing facilities; differing compliance requirements in each state; different departments enforcing legislation; and a lack of user-financed incentives, such as those that are used in other cities and states to incentivize compliance of waste recycling mandates and organic waste legislation.

Food waste can be transformed into a number of assets -- from biogas as an energy source and animal feed to compost for storm water management and other green infrastructure projects. Economic incentives already exist in Connecticut, New York, and New Jersey to encourage food-waste-to-biogas infrastructure, in the form of financial policy and premium pricing incentives. However, organic waste may also be turned into an asset through compost markets, a use that is not currently supported through economic incentives.

The Departments of Transportation in Connecticut, New York, and New Jersey utilize soil from compost for roadway construction projects; however the extent of compost in this use is difficult to measure through purchasing practices and procedures. Compost from food waste may also be used for storm water management at building construction and landscaping projects to reduce water runoff and soil erosion and improve water quality. Incentives for this type of use are seen in Pennsylvania and Boulder, Colorado. The tri-State region could learn from and potentially replicate these opportunities.

Finally, recommendations are made for regional collaboration to build on the existing infrastructure and enhance markets for products from processed food waste. Global Green's next steps in developing food waste reduction and recovery are also outlined.

BACKGROUND:
Regional Food Scrap Recovery

Across the country, less than 5% of food scraps are recovered for beneficial reuse.

The consequences include overuse of landfills, costs to cities and businesses, and the release of millions of tons of methane, a potent greenhouse gas. As the public becomes more concerned about this issue, the recovery of food scraps is increasingly in demand, particularly in the New York City Metropolitan region. In recent years, food waste diversion mandates covering large commercial generators have been passed in New York City and Connecticut (nearby Massachusetts has also passed one), and a similar mandate is being considered in New Jersey.

A key challenge for commercial food waste recovery in this geographic area is the availability of processing infrastructure to serve food businesses and institutions. As residential and commercial food scrap collection grows, more and more infrastructure will be needed. In New York City alone, Mayor de Blasio announced a goal in April 2015's OneCity plan that all New Yorkers will be given access to residential composting by 2018. On an annual basis about 1 million tons of capacity will be needed to meet this goal.[1] In many cases the same infrastructure serves both commercial and residential food waste streams, so expansions of infrastructure for one purpose will benefit both.

In stakeholder dialogues, we have observed a lack of knowledge concerning the status and capacities of new facilities under development. This regional outlook report is an update that starts by outlining existing processing facilities and those under development. Sharing information on these emerging projects is intended to help build confidence between city and state planners, as well as residents, restaurants, schools and businesses participating in food scrap collection, which will help keep support strong for these important programs.

The primary infrastructure scope of this report covers the area within a 100 mile radius of NYC, including areas in the states of New York, New Jersey and Connecticut. End-markets and broader policies are viewed within the entire tri-state region.

Legacy Impact of Food Scrap Diversion

In New York City, the commercial landfill mandate, if fully implemented, is expected to divert over 250,000 tons of food scraps from landfills annually.

Since food waste generates methane when it is buried in landfills, this diversion will reduce methane emissions by an anticipated 250,000 tons of GHG equivalent. The legacy impact of this action can be measured in two ways:

100 YEAR

The 100 year time frame:
Using a 100-year methane life measurement time frame, this will mitigate about 400,000 tons annually of CO2 equivalent emissions, a legacy impact of over 5 million tons over the next 20 years.

20 YEAR

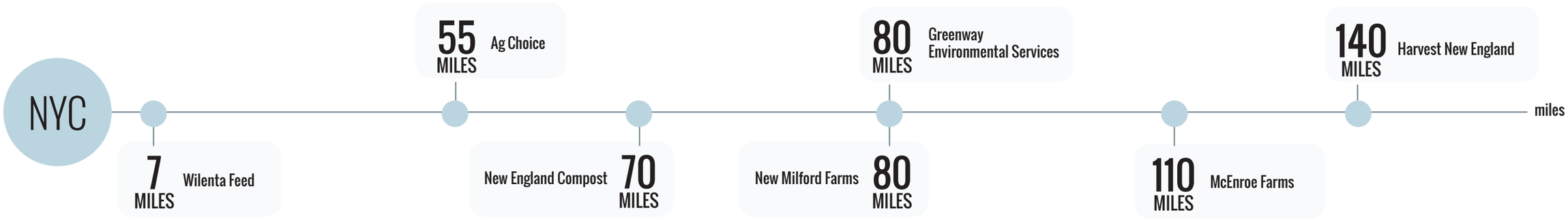
The 20 year time frame:
Unlike carbon dioxide that can remain in the atmosphere for hundreds or thousands of years, methane has a much shorter atmospheric lifetime.[2] In a 20-year time frame, a single molecule of methane has the global warming potential of 86 molecules of carbon dioxide.[3] Methane therefore constitutes a highly concentrated and severe threat to immediate global temperatures, particularly in comparison to carbon dioxide, the most common greenhouse gas. Using a 20 year time frame, the legacy impact of this action is over 20 million tons of greenhouse gases.

REFERENCE:
Matt de la Houssaye and Rebecca Miller “Methane Matters”. August 2015. Web. 24 August 2015. <http://thecorr.org/Methane%20Matters.pdf>

Food Waste Processing Facilities

Existing Facilities in the New York Metropolitan Region

There are at least 105,300 tons per year (TPY) of existing capacity for food waste processing in the New York Metropolitan region. This includes seven facilities throughout the states of Connecticut, New Jersey and New York, all but two of which are within 100 miles of New York City.



1. **New England Compost in Danbury, Fairfield County CT** is 70 miles from NYC and has a food waste capacity of 5,000 TPY. This Facility has a very stringent contamination policy, only accepting very clean food waste material from outside vendors.[5]

2. **New Milford Farms in New Milford, Litchfield County CT** is 80 Miles from NYC, and accepts 16,300 TPY of food waste.[6] The parent company, Garick, provides a wide range of soil amendments for residential and commercial use.

3. **Harvest New England in Ellington, Tolland County CT** is 140 Miles from NYC, outside the 100 mile radius. This site accepts 17,000 TPY of food waste.[7] They are operated by Harvest Power, a company with both US and Canadian operations. Harvest owns and operates a number of yard waste procesing facilities in the northeast and several anaerobic digestion facilities.

4. **Greenway Environmental Services in Clintondale, Ulster County NY** is 80 Miles from NYC. This small scale compost site accepts 1,000 TPY of food waste from college cafeterias and large vegetable markets.[8]

5. **McEnroe Farms in Millerton, Dutchess County NY is 110 Miles** away from NYC. The total amount of compost produced is 30,000 Cubic Yards per year, this includes all feedstocks.[9] The facility is co-located on McEnroe Organic farm.

6. **Ag Choice in Andover, Sussex County NJ is 55 Miles** from NYC and accepts approximately 10,000 TPY of food and food processing waste.[10] Ag Choice operates both aniimal feed and compost production facilities.

7. **Wilenta Feed in Secaucus, Hudson County NJ** is 7 Miles from NYC and accepts 60,000 TPY of bakery waste (flour, dough, stale bread, Brewers grain, and residue from food processors) and recycles it into animal feed.[11] Wilenta prefers not to have contaminants since they then have to pay to dispose of them. However, contaminants are cut and vacuumed out of the feed stream.[12]

***The information presented here is a summary of food waste capacity only, and does not contain the amount of yard waste or other feedstock. All of these facilities are designed to take feedstock with very low contamination, and without compostable plastics.**

Food Waste Processing Facilities

Facilities Under Development

According to a survey conducted by Global Green in Spring 2015, there is approximately 512,750 tons per year of food waste processing capacity currently under development in the region, over five times the amount of existing capaciity. There are a total of nine food waste digestion facilities under development in Connecticut, New Jersey, and New York within the 100 mile scope of the NYC commercial food waste law.[13] These facilities encompass a variety of technologies and approaches including:

All nine facilities fall within the category of "anaerobic digestion" however, the approach varies from facility to facility. Broadly speaking, there are three categories:

1

ANAEROBIC DIGESTION

This type of facility receives food waste from off-site. Methane is captured from decomposing food waste and converted to a biogas natural gas replacement or combusted to create electricity. A digestate slurry is created from remaining organic material. The digestate is either 1) sent to an on-site wastewater treatment plant, 2) hauled away for processing at a compost facility, or 3) composted on-site.

2

ANAEROBIC DIGESTION PAIRED WITH COMPOSTING

Composting: Simply put, this option is when composting and anaerobic digestion are co-located.

3

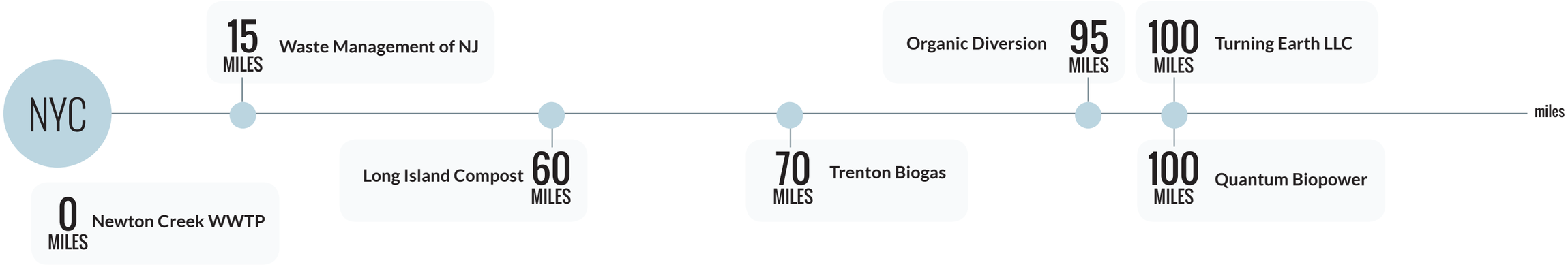
ANAEROBIC DIGESTION AT WASTEWATER TREATMENT PLANTS (WWTPS):

If there is excess capacity in the anaerobic digesters at WWTPs, food waste can be added to the wastewater treatment process to generate more energy. This is referred to as "co-digestion." Additional outputs after the materials are digested to create biogas are biosolids and centrate (the liquid material that is left and discharged to nearby receiving water bodies).

The peformance of this solution as "resource recovery" depends on the recovery of all (or most of) the outputs from these processes, including nitrogen, phosphorus, carbon content, and other nutrients. The option where this needs to be reviewed the most is co-digestion. In NYC, up to 30% of biosolids are composted, and no known examples exist for the capture of nutrients from centrate for recovery as opposed to landfill.[14,15] Currently most of the city's 14 WWTPs do not capture the biogas and the methane is flared, though New York City DEP plans to build more biogas captures from WWTPs.

Generally, the ability of anaerobic digestion facilities to accept compostable plastics or some level of contamination is based on their screening process, in particular whether they screen the material before or after it is digested. If it is screened prior to digestion, this will prevent the digestion, and subsequent composting, of any compostable plastics in the stream, since they cannot be easily distinguished from non-compostable contaminants.

Facilities Under Development (continued)



1. **Quantum Biopower in Southington, Hartford County CT** is an anaerobic digestion plant 100 Miles from NYC. Its capacity will be 40,000 TPY of food waste.[16] Quantum's parent company also owns a landscaping, land-clearing and right of way business, a potential complement to production of compost from the digestate.

2. **Turning Earth LLC, also in Southington, Hartford County CT** is an anaerobic digestion plant that will accept 50,000 TPY of food waste.[17] Turning Earth plans to use a combination of co-located composting and anaerobic digestion, the heat of which will be used for greenhouse-grown produce.

3. **Long Island Compost** is planning an anaerobic digestion facility co-located with their composting facility in Long Island that will have 120,000 TPY of food waste capacity. Estimated operation commencement is in early 2016.[18]

4. **Newton Creek WWTP in Brooklyn, Kings County NY** has recently launched a new program introducing food waste to their digester stream. The facility is expected to accept 18,250 TPY of food waste by the end of 2015, and expand to a capacity of up to 91,250 TPY within 3 years.[19,20]

5. **Organic Diversion in Gloucester City, Camden County NJ** is an anaerobic digestion facility 95 miles from NYC, with a starting food waste capacity of 32,500 TPY.[21] The developer of this project has existing hauling operations in New Jersey, which is an asset for feedstock acquisition for new facilities.

6. **Trenton Biogas in Trenton, Mercer County NJ** 70 miles from NYC, has received approval from NJ DEP[22] to retrofit a never-before-used sludge processing plant into an anaerobic digestion facility. The facility will have a food waste capacity of 100,000 TPY.[23,24]

7. **Waste Management of NJ in Elizabeth, Union County NJ** have received approval from the NJ DEP to build a facility on an existing solid waste transfer station that will pre-process food waste for composting or anaerobic digestion at a wastewater treatment plant.[25,26]

8. An additional small scale dry anaerobic digestion facility is under development in Northern NJ, within 25 miles of NYC. The developer of this facility is currently confidential. The facility's processing capacity will be approximately 32,000 TPY.[27]

9. A large anaerobic digestion project is under development within 100 miles of New York City. The facility is planned to accept over 120,000 TPY of food waste. Additional details about this project are currently confidential.[28]

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Building Infrastructure and Market Success

The food waste processing sites under development demonstrate encouraging movement by the private sector.

However, these sites are by no means guaranteed to be successful. To ensure success, feedstock must be secured, the infrastructure itself must be functional and efficient, and the markets for the products made at these facilities must be developed.

Securing Feedback

To build infrastructure, creditors need some confidence that facility developers will have a reliable flow of feedstock. Measures implemented by either the public or private sectors that increase diverted food waste and help build market confidence include education programs and commercial food waste mandates. Large commercial sector food businesses that generate significant amounts of low-contamination waste are highly valuable to processing facilities and haulers alike as they provide relatively large volumes of waste at individual stops.

To build investor confidence, assurance is typically needed that feedstock can be consistently received over the period of time necessary to pay back investors. In practice, this can be very difficult given that commercial food businesses may be reluctant to enter into long-term contracts.

On top of this business difficulty, regulatory challenges may exist as well. For example, in New York City long-term contracts are prohibited - the NYC Business Integrity Commission requires any solid contract to be for 2 years or less.[29] While the goal of this requirement is to build a fair and competitive business environment, this lack of ability to lock in a long-term contract makes it difficult to secure confidence from investors for processing facilities that depend on commercial waste feedstock. Globally, it is far more common for facilities to be financed on the basis of long-term feedstock contracts with municipalities for residential food waste.[30]

Funding and Premium Pricing for Environmental Attributes

Infrastructure Funding

Connecticut, New Jersey and New York have financial policy incentives in place to support development of food-waste-to-biogas infrastructure.

Connecticut

Connecticut Energy Finance and Investment Authority (also known as “Connecticut Green Bank”) consolidates public and private funds for clean energy investment across the state of Connecticut. Incentives and innovative low-cost financing are offered to encourage homeowners, companies, municipalities, and other institutions to support renewable energy and energy efficiency.[31]
The Connecticut Green Bank offered funding for anaerobic digestion projects from 2013-2015 as either a grant, loan, or power purchase agreement.[32]

New York

New York Green Bank, a division of the New York State Energy Research and Development Authority (NYSERDA), invests in a variety of clean energy and greenhouse gas reduction technologies and projects in New York State, including anaerobic digestion.[33] Through NYSERDA, New York State Renewable Portfolio Standard funding is also available to support Anaerobic Digester Gas-to-Electricity Systems in New York State.[34]

New Jersey

New Jersey Green Bank provides loans and grants that will support various renewable energy, smart grid technology and energy storage projects in the state of New Jersey.[35] Additional incentives are offered via the New Jersey Clean Energy Program’s Sustainable Biopower Incentive. The program aims to provide financial incentives to biopower projects, including anaerobic digestion projects that generate electricity.[36]

Premium Pricing for Environmental Attributes

One economic mechanism supporting environmental products such as renewable energy is price premiums for environmental attributes. In the case of New York, Connecticut and New Jersey, this is accomplished through Renewable Portfolio Standard programs. The Renewable Portfolio Standard provides states with an incentive for increasing renewable energy production, the ultimate goal being stimulation of market and development of technology to make renewable energy economically competitive with traditional forms of energy generation.[37]

Biogas, one of the products that can be derived from food waste, is the only product that the premium pricing market supports in the tri-state region. While there are a number of infrastructure and energy market incentives for biogas projects there are no similar incentives for food waste made into other products such as soil and animal feed. Tax incentives do exist for food waste donations, however, food donations are generally not considered as a part of the overall solid waste recycling and reduction strategies of solid waste agencies.

Energy Markets: Products Derived from Food Waste

Table 3: Premium Pricing in the Tri-State region

	RPS includes biogas to electricity	Price (kWh)
NY	yes	$0.02 (August, 2014)
NJ	yes	*variable*
CT	yes	$0.05 (2012)

This table shows how premium product pricing applies for electricity generated from biogas in New York, Connecticut and New Jersey, accomplished through the Renewable Portfolio Standard program. Biogas can be refined and sold in natural gas markets, or it can be combusted in an anaerobic digestion process and converted to electricity. Table 3 presents the most current available information - prices vary from year to year.

Education and Compliance

Tri-State Region: Compliance Responsibility

States and cities in the region have varying tactics for compliance with food waste legislation. A summary of different approaches is provided below in order to compare best practices and strategies among different cities and states, including the parties responsible for compliance and what compliance entails.

Connecticut
The food scrap generating business is solely responsible for source separating its organic waste to ensure it gets recovered. The organics processing facility is to report a summary of fees charged for the receipt of organic materials to the Commissioner of Energy and Environmental Protection.[38,39]

New York City
For New York City, responsibility is given to both the hauler and the generator. The food business is responsible for ensuring the recovery of all its generated organic waste, which includes affixing an easily visible sign stating the organic waste collection/transport information, and providing separate bins as well as instructions for organic waste disposal. This is enforced by the Department of Sanitation, the Department of Health and Mental Hygiene, and the Department of Consumer Affairs. The waste hauler is responsible for delivering the organic waste to an organics processing facility or to a transfer station that will do so. This is enforced by the Business Integrity Commission. The Sanitation Commissioner is to evaluate the capacity and cost of all facilities within the designated area (100 mile radius of New York City) on a regular basis and no less than annually.[40]

New Jersey
According to an act introduced but not yet enacted, responsibility would be placed on food waste generators producing 104 tons per year (2 tons per week) of food waste to send this material to a food waste recycler, provided a facility exists within 25 miles of that generator.[41]

Education and Incentives Outside the NYC Region

Education and incentives, frequently administered through a public agency, are important for organics mandates to ensure compliance and support by businesses. Often, these programs are "user-financed," meaning they receive a certain fee per unit of waste that is discarded or disposed within their jurisdiction. As commercial education and outreach programs such as those included in Mayor de Blasio's OneCity plan ramp up, there are many examples to draw from on how education and incentives are being applied across the country.

Seattle
Food businesses are responsible to ensure recycling of their organic waste. Seattle Public Utilities (SPU) is responsible for enforcement. Non-compliant properties will receive a $50 fine after two warnings. SPU began an education campaign in October 2014, 2 months before the law went into effect and 9 months before start of enforcement.[42]

Metro Vancouver
Large food waste generators are required to source separate their food waste. After an education period of 6 months, a surcharge will be applied if the amount of organic waste exceeds 25% of a garbage load. The law will be enforced when waste haulers deliver garbage to regional facilities for inspection. Waste haulers will be charged an additional 50% of the cost of disposal for loads of garbage with excessive food waste.[43,44,45]

Food Business Incentives
The following states have examples of how a financial incentive approach could be implemented to spur compliance with organic waste legislation.

West Virginia
A law was proposed, but not passed, creating a tax credit for businesses who compost their organic waste. The allowable credit amount was to be 50% of the contracting cost with a composting facility, up to a maximum of $2,000 per year.[46]

Oregon
A law was passed in June 2014 to allow for crop growers who make a donation of crop to receive a tax credit. The credit amount is 15% of the wholesale value of the donated crop.

CASE STUDY: MASSACHUSETTS

Massachusetts Commercial Food Waste Mandate

Summary

In October 2014, a Massachusetts disposal mandate on commercial food waste went into effect. The mandate applies to all businesses and institutions that dispose of at least one ton of organic waste per week, requiring them to divert their food waste from landfills by reducing the amount of generated food, donating unused food, or processing food waste in an on or off site processing facilities such as anaerobic digesters, compost facilities, animal feed or other industrial uses.[47] According to the Massachusetts Department of Environmental Protection (MassDEP), organic waste from targeted businesses and institutions amounts to over 600,000 tons per year.[48] Massachusetts hopes to divert 200,000 tons per year of this material as a result of the ban and supporting programs.

Education and Enforcement

Massachusetts' RecyclingWorks program is dedicated to business and institution resource recovery assistance. In addition to the RecyclingWorks program, MassDEP recently hired three employees dedicated solely to waste disposal ban compliance. The current Recycling Works budget is $500,000.[49] RecyclingWorks is implemented by the Center for EcoTechnology (CET), a non-profit 501(c)3 organization, under contract to MassDEP.[50,51] Any business or institution covered by the 2014 food waste mandate can receive assistance from RecyclingWorks to assist with compliance, as well as reducing food waste generation, or donating food waste.[52]

Use in Roadway Projects and Green Infrastructure

In order to ensure the economic sustainability of food waste recovery, a robust and growing market for products made from food waste will help to complete the closed loop. Compost can be used in a diverse set of urban and rural uses including building new parks, agriculture and green roofs.

A strategic opportunity for incorporating compost and achieving benefits for urban areas is the incorporation of compost into specifications for government and private sector purchasing. Examples of this include storm water management, soil erosion prevention and water quality.

This market can be divided into two main categories:

1) Soil application (no specific performance requirements)
2) Soil application tied to meet specific performance requirements.

In both cases, the use of compost can provide needed services within the urban eco-system, including improving storm water management, soil health, and water quality. Additionally, the use of compost has been found to foster carbon sequestration by increasing soil microbial and plant activity.[53]

A key concept in understanding these guidelines is "soil organic matter content." Organic matter is essentially anything that was once alive, and the addition of microbes and soil organic matter in compost help rejuvenate the soil.[54] In natural environments, healthy soil is constantly exposed to air, sunlight, and organic matter from falling leaves or other plant material. In urban environments, this organic matter cycle does not occur due to the lack of plants and the abundance of impervious paved surfaces. Adding compost to soil is a manmade way of achieving this natural cycle, and is often the least expensive and most effective way to improve soil health.[55]

Soil types vary everywhere, including soil characteristics like organic matter content, which makes soil application complex. While some soil types may be in need of more soil organic content, others may not.[56] There are, however, several examples of markets for compost made from organic waste that could potentially be expanded within urban areas. A big opportunity for increasing compost use in urban areas is Department of Transportation (DOT) landscapes.

Soil is most commonly specified and purchased in DOT projects with new roadway projects or repairs to existing roadways. The soil purchasing and specification decisions by contractors on these projects is either mandated or influenced by city or state-level guidelines, voluntary state-provided best practices, or optional specifications that can include compost to varying degrees.

COMPOST MARKETS

New York City is used as an example below to illustrate how large a potential urban roadway market could be for compost.

The Urban Opportunity: Compost for Roadways in New York City

According to staff at NYC Arterial Roadway Repair and Maintenance, much of the 1,700 acres of in-city DOT land could benefit from absorbing large amounts of compost as a means of improving the long-term health of the landscapes. Roughly half of NYC DOT's 1,716 acres of landscapes are lawns and half are woodlands. DOT could annually apply up to 2" of compost in woodlands and 1" of compost on lawns. Based off estimates from Massachusetts Department of Environmental Protection, we assumed that each 2 inches of compost adds a weight of 8.1 lbs. per square foot. Using these values for weight and the compost application, a total of 227,000 tons of finished compost could theoretically be applied. These numbers are provided as an illustration of the magnitude of compost that could be applied locally. Application rates need to be evaluated for each project to match the applicable soil type and characteristics.[57]

Compost Listed in DOT Specification: Tri-State Region

In the tristate region, states have different practices for how soil is specified for use in DOT projects. These projects fall under the first category above and in the tri-state region, are typically not tied to specific performance metrics. Below is a summary of these specifications for each state.

Connecticut

ConnDOT has adopted a materials specification for compost and a construction detail which allows the substitution of peat for compost.[58] Compost is included in the ConnDOT "Standard Specifications for Roads, Bridges and Incidental Construction."[59] Connecticut considers yard trimmings and source separated organics to be acceptable inputs for compost, but has not approved nor do they plan to approve any biosolids (one of the outputs of a wastewater treatment facility) for use in compost.[60] This indicates that the nutrients from food scraps that are co-digested at WWTPs will not afterward be available for reintroduction into soils through this means.

New Jersey

NJDOT allows for the use of compost or composted biosolids as a soil additive. This may consist of a stabilized, screened mixture of wood chips and solids from a wastewater treatment plant, and must be processed according to NJDEP standards. Compost can also include leaves, yard trimmings, food scraps, manure, forest and food processing residuals, bark, and paper. NJDOT also requires at least 30% organic content for compost.[61]

New York

NYDOT has a specification for the use of compost as an "organic material used in conjunction with amending or manufacturing topsoil." Between 2% and 20% of topsoil must be composed of organic matter. Composted biosolids used in topsoil require a certificate of verification from the NY State Department of Health that all topsoil has been produced with approved composted biosolids.[62]

From conversations with stakeholders, it is clear that compost is used to some degree in tri-state DOT projects to meet soil and storm water control performance criteria - most notably soil organic matter content. With current tri-state DOT purchasing practices and procedures, it is difficult to ascertain the amount of compost being purchased by DOTs in different states. In order to track this purchasing, the weight or volume of compost would need to be recorded as a percentage of overall soil purchased.

Organic matter can come from any material containing plant and animal decomposed matter such as peat, compost or other sources. This makes it challenging to utilize purchasing policies as a direct part of building compost markets. More research is needed to ascertain if and when compost as a material input should be exclusively specified as a material input as part of a larger bulk soil purchase.

Compost for Storm Water Management

Building on these examples of transportation-related projects, there are additional opportunities for improved urban water management and increased compost use. Historically, storm water in cities has been managed by large and costly underground storm sewer systems, the main purpose of which is to quickly collect and carry runoff from city streets. These waters can contain pollutants and often flow directly into nearby surface waters, compromising water quality.

"Green infrastructure" is an alternative to these storm drain systems. This category can include a variety of approaches for managing storm water in a more sustainable manner by creating an area of soil and plants that will absorb rainwater and utilize natural soil and plant processes to retain, slow down, and filter storm water runoff. These approaches seek to prevent water pollution in order to protect local water quality while achieving additional benefits such as improved public health, quality of life, and economic development.[63]

A specific opportunity to integrate compost into green infrastructure programs is with storm water management regulation. According to USEPA, the benefits of compost use in green infrastructure storm water applications include storm water runoff management, removal of pollutants, and soil erosion prevention.[64] Best management practices and specifications at the state level can help incorporate the use of compost in soils used on green infrastructure projects. Storm water regulations are overseen and enforced by a regulatory arm in every state to ensure compliance to national standards set by the EPA.[65]

Construction projects involve moving large amounts of soil. In the process, soil can easily be washed away by storm water and eroded. Soil erosion that occurs at construction sites can cause significant amounts of sediment to enter the local surface water network and degrade overall water quality.[66]

To address this issue, point source water pollution is federally regulated. To meet these requirements, some states require construction projects to implement and maintain best management practices (BMP) to reduce erosion and sedimentation. Silt fences are the most widely used method for controlling soil and sediment erosion on construction sites. These temporary fence-like structures are placed along construction site perimeters to trap sediment, and removed when a construction project is complete.[67,68]

Compost for Storm Water Management (cont.)

Compost can be used in various applications as an alternative to silt fences. Examples include compost filter socks, compost filter berms, and compost blankets.

Beyond simply specifying soil organic matter content mentioned earlier, one way that compost use can be increased is with performance related metrics for water management and pollution control. Performance results from using compost listed by EPA include:

// Reducing Water Runoff and Soil Erosion

Water runoff often carries the ground beneath it as it moves over the land, causing soil erosion. Compost increases the water absorbing capacity of soil[69], which can stop or reduce water run-off and soil erosion.

// Improving Water Quality

Sediment and pollutants in storm water runoff impair water quality when they reach surface waters such as lakes, rivers, streams, groundwater, or oceans. Compost improves water quality by capturing sediment or absorbing pollutants contained in water run-off such as heavy metals, nitrogen, phosphorus, oil and grease, fuels, herbicides, and pesticides.[70]

As an example of the benefits of compost use, a University of Georgia study demonstrated that the application of compost **reduced soil loss by 86%** compared to a scenario with no compost application. Compared to silt fences, sediment pollution to nearby surface waters was **reduced by 99%**.[71]

At a national level, point source water pollution is regulated under the National Pollutant Discharge Elimination System (NPDES) program. Sanctioned by the Clean Water Act, the NPDES permit program regulates sources that discharge pollutants into US waters.[72] This creates another opportunity for compost to be used in roadways and green infrastructure.

As a way to comply with NPDES regulations, compost use can be increased when engineering and regulatory stakeholders help craft and adopt programs, such as those in the state of Pennsylvania and Boulder, Colorado. Both have implemented policies that encourage the use of compost as a soil and sediment erosion BMP, as described below.

The Silt Fence commonly used for soil and sediment erosion control.

Images from Risse, M. L. and Faucette, B. (2009). Compost Utilization for Erosion Control. University of Georgia

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COMPOST MARKETS

Best Management Practices and Agency Partnerships

Pennsylvania

The Pennsylvania Code requires all construction projects involving land moving activity to implement and maintain BMPs to reduce erosion and sedimentation.[73] To guide and inform those engaged in "earth disturbance activities", Pennsylvania Department of Environmental Protection (PennDEP) lists the use of compost as a BMP in their erosion and sediment control manual. Examples of compost use as a BMP include compost filter socks, compost filter berms, or simply applying a layer of compost to the land.[74,75]

The same BMPs for erosion control and water quality that apply to all projects can be used for larger projects of 1 acre and above, which create an opportunity for larger scale individual orders of compost. In addition to the BMP requirements for all construction projects, the Pennsylvania Code requires any project with over 1 acre of land of "earth disturbance"[76] to obtain an NPDES Permit or coverage under a general NPDES permit for Storm water Discharges Associated with Construction Activities.[77,78]

PennDEP and Pennsylvania Department of Transportation (PennDOT) joined forces in an innovative Strategic Recycling Program. The program's objectives include realizing economic and environmental benefits, pollution prevention, recycling, and energy efficiency by implementing waste reduction strategies and encouraging the use of recycled materials in PennDOT operations.

With the oversight of the Strategic Recycling Program, Pennsylvania has succeeded in incorporating the use of compost as erosion and sediment control in the vast majority of the state's DOT projects.[79,80]

Compost Use in City Building Codes & Storm-water Regulations

Boulder, Colorado

Boulder has successfully integrated compost into the building permit process. Boulder's Green Building and Green Points requires all remodels, additions to current residential units, and new residential units to earn a minimum number of Green Points. Utilizing organic soil amendments can earn a building up to 2 Green Points through using at least three cubic yards of organic material for landscaping. All organic material used toward Green Point certification must meet U.S. Composting Council or equivalent standards. The Planning and Development Services staff inspect and verify all landscapes to award appropriate Green Points.[81]

In addition to the Green Points program, Boulder has included compost in other areas as well. Boulder's storm water regulations allow developers to achieve storm water runoff performance requirements by using compost.

// Projects that involve land clearing need to have at least 25 feet of a natural buffer zone to prevent storm water runoff.[82] Boulder developers can achieve this via mulching or applying organic material over bare or recently seeded soil.[83]

// As a member of the Keep It Clean Partnership,[84] Boulder, CO, has successfully met all NPDES thresholds and has established BMPs for soil disturbances, product usage, and site rehabilitation.[85] Boulder recognizes that organic soil assists with permeability, water-holding capacity, nutrient availability, and pollutant filtration.

COMPOST MARKETS

Opportunities for Tri-State Region

These examples could be opportunities for the Tri-State region to learn from and potentially replicate. In order to implement programs in the tri-state region, solutions may need to be tailored to local conditions.

As a next step, further research is needed to develop a list of studies or case studies that demonstrate the impact of compost in erosion and sediment control best practices for individual sectors such as:

// Large real estate development (general)
// Construction projects on steep slopes where erosion control is a priority
// Department of Transportation projects

The impacts that such programs could have in the tri-state region include building markets for compost, storm water benefits, and reduced reliance on unsustainable soil inputs such as peat from “mined” wet-lands.

REGIONAL OUTLOOK

A growing amount of capacity is being developed in the tri-state region. Below are recommendations for maximizing the opportunity of building regional infrastructure, enhancing markets for products made from food waste, and supporting the health and vitality of our soil.

Recommendations for Regional Collaboration

1. **Follow Pennsylvania's lead** and develop integrated cross-agency approaches for addressing the interconnected needs of urban resiliency, water management, and resource recovery.

2. **Create a fairer playing field** for food scrap recovery that uses EPA's food waste hierarchy as a guide for the priority of incentives. While biogas incentives are useful, incentives for food scrap recovery that include market incentives for soil, feed, donations, and most of all source reduction will provide a more balanced approach. This can start by building on existing tax incentives for food donations, and evaluate expanded incentives for both farmers and food establishments.

3. **Continually evaluate** the compatibility of residential and commercial food scrap collection programs, in particular the expected levels of compostable plastics and contamination, with the existing and emerging regional food scrap processing infrastructure and the products it is designed to manufacture.

4. **Survey tri-state regio**n food scrap processing sites under development to assess what needs to happen to give these projects the greatest chance of success. Develop policy that integrates feedback from developers, local government agencies and community groups.

5. **Building on leadership in Massachusetts**, the tri-state region can add commercial sector education funding to support holistic solid waste management.

6. **Create regional collaboration** concerning development of end-markets for compost, waste generator education and incorporation of food waste reduction into regional greenhouse gas mitigation strategies.

7. **Incorporate more transparent purchasing standards** in tri-state region construction and roadway projects in order to utilize compost.

8. **Promote regulatory performance requirements** for supporting government and private sector projects to meet storm water, soil erosion, and water quality standards. Highlight and promote best practices of companies and government agencies that utilize compost to meet and exceed performance standards.

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