



# **PARTNERING FARMS AND COMMUNITIES:**

## **A Regulatory and Start-Up Guide for On-Farm Food Scrap Composting**



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# Introduction

## About this Guide

It's a natural fit for farms to accept and compost food scraps from their communities, but there are many considerations for farms and communities to manage, such as building relationships, acquiring technical expertise, developing systems and navigating regulatory oversight. This guide is the result of research conducted by the Farm to Plate Food Cycle Coalition (starting in 2019) to help work through these considerations.

This guide aims to clarify the regulatory landscape and lays out potential options for community-oriented solutions to close regional gaps in the composting infrastructure currently available in Vermont. It also aims to encourage connections between small farms and composting entrepreneurs to residents, schools, food shelves, grocery stores, restaurants, and other organizations to manage food scraps and nutrients locally.

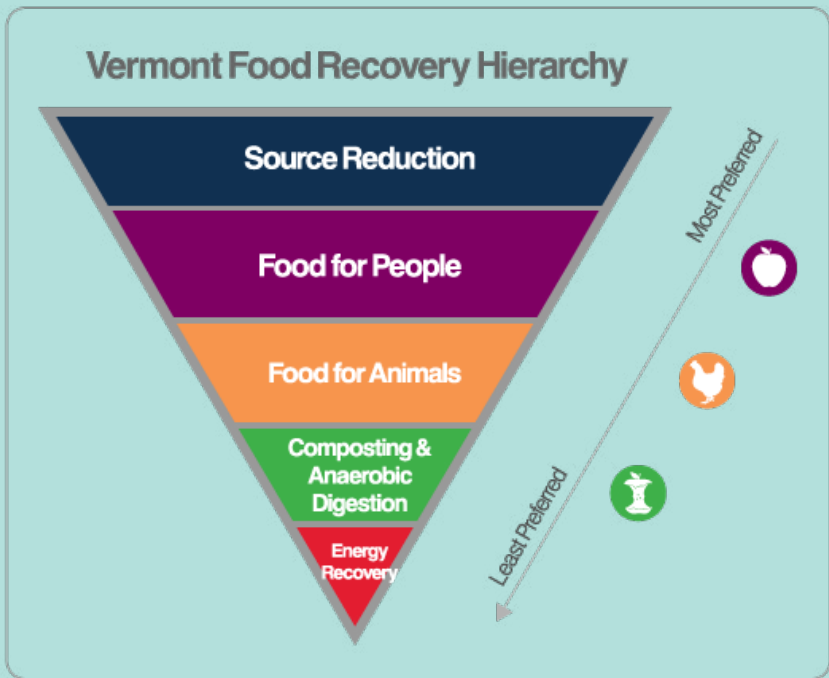
This guide is not a manual on how to compost. For more information about how to compost, check out the resources at the end of this guide.

Lastly, the regulatory landscape is not static. Recently passed legislation, [Act 41](#), changes the jurisdiction of some on-farm composting practices, from the Vermont Agency of Natural Resources (ANR) to the Vermont Agency of Agriculture Food and Markets (VAAFMM). As Act 41 makes its way through the implementation process in 2022, some changes are expected.

## About On-Farm Composting

Vermont's Universal Recycling Law ([Act 148](#)) came into full effect in July 2020, effectively banning food scraps from the landfill. Food scraps are among the few materials that can be "recycled" locally, thereby maintaining this valuable resource within a community and for community use.

Engaging farmers in diverting organic materials like community food scraps through on-farm composting is an effective and economical way to support decentralized food scrap management to meet the Universal Recycling Law mandate.



Vermont’s Food Recovery Hierarchy, established in statute in Act 148, prioritizes actions that can be taken to prevent and divert wasted food from the landfill. The top levels of the hierarchy are the best ways to prevent and divert wasted food because they create the most benefits for the environment, society and the economy. In the yellow band, Act 148 references diversion for agricultural use, including consumption by animals.

Composting on farms can support diversion of food scraps and other organic waste from the landfill in order to improve existing on-farm manure management practices, increase soil health and fertility, reduce the need for imported commercial fertilizers, and support and strengthen the local food system and nutrient cycle.

Community composting systems are larger than home composting but smaller than what is typically considered industrial composting. While on-farm composting systems might be large enough to require certifications, they (often) differ from industrial scale composting in that they tend to be community-oriented regardless of size.

Farms and community members can benefit from partnering to reduce and manage food waste. Farmers can provide an environmental service that improves farm fertility while lowering off-farm inputs. This practice also has the potential for providing additional farm revenue and/or an opportunity for a community entrepreneur to partner with a farm to create a community composting initiative.

When communities work together to compost food scraps locally, they close the nutrient loop while reducing emissions from trucking waste and possibly saving on associated hauling fees. Simple community education on how to separate waste from the organics stream, also called source-separation, will reduce or eliminate contaminants like rubber bands, plastic wraps and other small items from entering compost, soil and waterways.

## **Community-Oriented Food Scrap Composting**

Designed to keep organic waste in the towns in which it is generated, community-oriented composting is particularly well suited for small town and rural communities. It has a number of advantages:

1. It avoids the carbon footprint of trucking food scraps.
2. It keeps the nutrients locally available to make valuable soil amendments.
3. At a certain scale, it provides local, sustainable jobs.
4. It engages communities in becoming invested in keeping food scraps out of the landfill.
5. It engages communities in being accountable to preventing soil and compost contamination through source separation.
6. In many cases, it centralizes and builds upon the important role that farms play in rural communities and local food systems.



## **Case Study:** Strafford Village Farm

Since 2015, Strafford Village Farm has collected food scraps from the local elementary school kitchen and the village store amounting to one or two 5-gallon buckets per week (about 100 buckets or 2 - 3 cubic yards per year), well below the scale at which ANR would have regulatory oversight.

Each week the farmers collect the food scraps and haul them back to the farm where they are layered into the compost pile. The other compost feedstocks are vegetative farm waste and bedding (mostly hay and straw with some manure) collected from the barn. The majority of animal manure is left on pasture where the livestock graze. The service is largely an effort to help the community comply with the Universal Recycling Law and close the nutrient loop locally.

This very low-tech composting system is active throughout the year, capturing local nutrients and providing a small amount, about 1/8 ton per year (250 lbs), of finished compost used for enhancing soil biology, fertility, and water holding capacity in pasture and hay fields on the farm. Strafford Village Farm practices organic methods but is not certified organic. Because high temperatures are not maintained in the pile, the finished compost is not used on their vegetable crops.



## **The Regulatory Landscape**

### **The Simple Road**

If, like Strafford Village Farm, you are just managing a few totes of food scraps per week, have no plans to increase the volume and want to keep it super simple, stop here. Happy composting!

To become familiar with the regulatory pathways to expand your composting or volume of food scraps hauling, read on.

### **The Regulatory Landscape**

Farms and farming activities are regulated by the Vermont Agency of Agriculture, Food and Markets (VAAFAM). Discarded organic wastes (food scraps, food processing residuals, etc.) are not considered agricultural products but rather a form of solid waste. Management of discarded organic wastes through composting is generally considered solid waste management—even when done on a farm as part of an agricultural system. The types of farming activities conducted on the farm; the volume, type and source of organic “waste” being managed; and the end use of the finished compost determine which state agency has oversight. The Agency of Natural Resources (ANR) currently has jurisdiction when larger volumes are being managed.

In addition to solid waste regulations from ANR, composting

on a farm may have implications under [Act 250](#), for organic certification, and for some farming best practices and safety considerations. It's a bit confusing!

This section of the toolkit provides an overview of when and how different rules come into play for on-farm food scraps composting, and points to several good resources for learning more about whichever details are relevant to you.

## **Agency of Natural Resources Solid Waste Thresholds**

This section is intended to help clarify the volume thresholds and rules a farm or compost site must follow to avoid being regulated as a solid waste management facility. We also include resources for becoming a registered or certified compost facility under ANR rules, should a farm decide to go in that direction.

ANR has four categories of compost facilities:

- Exempt
- Small, which requires registration
- Medium, which requires a categorical certification
- Large, which requires a full certification

Registered and certified facilities may also be subject to [Act 250](#). You can find more information about the registration and certification processes on the [Solid Waste Facility Application Forms webpage](#).

Operators of Small, Medium and Large facilities are required to take an approved operator training course. Currently, the [Vermont Compost Operator Certification Training](#) course offered by ANR is the only approved Vermont-based training. A [complete list of approved courses](#) is maintained by ANR. ANR's Waste Management and Protection Division (802-828-1138) can provide more information and updates to the approved training list.

The following chart is a summary of the ANR requirements, specifically the Solid Waste Management Rules (Sub-chapter 11, pages 124-125 of the [2020 Solid Waste Management Rules](#)), as applicable to on-farm composting. For the most up-to-date information from ANR, visit their [cheat sheet](#).

## Considerations to Determine Regulations & Facility Size

	Exempt	Small Composting Facilities
Animal manure, absorbent bedding and clean high carbon bulking agents/feedstocks from your farm or other farms	Any amount provided the compost is used for soil enrichment	
Vegetative farm waste from your farm or other farms [does not include pre- or post-consumer food scraps or food residuals]	Any amount provided the compost is used for soil enrichment	
Import no more than __ of food scraps/residuals from off-farm per year.	42 cy/yr (roughly 32 5-gallon buckets per week, year-round)	2000 cy/yr combined
Import no more than __ of food processing residuals	1,000 cy/yr (roughly 10 semi-trucks full)	
Import no more than ___ yards per year of solely leaf, yard, plant and untreated wood residuals	3,000 cy/yr	3000 cy/yr
Import animal offal, slaughterhouse wastes, or animal mortalities for composting*	None allowed	None allowed
Area for compost management (not including finished compost storage areas or leachate/stormwater management areas) must be...	No requirements	<4 acres
Registration/certification requirements	No requirements	Requires <b>registration</b> with ANR. Operated in accordance with the Accepted Composting Practices.

	<b>Medium Composting Facilities</b>	<b>Large Composting Facilities</b>
<b>Animal manure, absorbent bedding and clean high carbon bulking agents/feedstocks from your farm or other farms</b>		
<b>Vegetative farm waste from your farm or other farms [does not include pre- or post-consumer food scraps or food residuals]</b>		
<b>Import no more than ___ of food scraps/residuals from off-farm per year.</b>	5000 cy/yr combined	
<b>Import no more than ___ of food processing residuals</b>	35,000 cy/yr (40K without food waste)	
<b>Import no more than ___ yards per year of solely leaf, yard, plant and untreated wood residuals</b>		
<b>Import animal offal, slaughterhouse wastes, or animal mortalities for composting*</b>	Allowed; see sub-chapter 11, page 139 of the 2020 Solid Waste Management Rules	Allowed; see sub-chapter 11, page 139 of the 2020 Solid Waste Management Rules
<b>Area for compost management (not including finished compost storage areas or leachate/stormwater management areas) must be...</b>	<10 acres	No requirements
<b>Registration/certification requirements</b>	Requires <i>certification</i> with ANR	Requires <i>certification</i> with ANR

If you are unsure as to which requirements apply to your system and/or site, you must contact ANR/ DEC's Certification Section Manager (anr.scrapfoodwaste@vermont.gov and 802-828-1138) to discuss your specific situation.

\*If you compost imported animal mortalities, animal offal or slaughterhouse waste, a solid waste management certification (medium-sized facility) is required. Animal waste and mortalities from your own farm are not subject to the 2020 Solid Waste Management Rules. Contact ANR's Waste Management and Protection Division (802-828-1138) for more information.

## What about community composting projects that do not take place on a farm?

There are exemptions for off-farm composting sites as well (at community gardens, in neighborhoods, at libraries, churches, town halls, businesses, schools, camps, and other locations). For these sites, no more than a total of 100 cubic yards organic solid wastes can be imported per year. No more than 42 of the 100 cubic yards can be food scraps. Note, however, that there may be local ordinances to consider in terms of zoning, set-backs, floodway, wetlands, etc. Additionally, managing nuisances to avoid community complaints is important.

### Understanding Volume Thresholds

The contents of food scraps and feedstocks vary widely. Both volume and weight depend on what the materials are, their particle size, their moisture content and how fresh or aged/decomposed the materials are when they arrive. For example, consider the difference in weight of one cubic yard (cy) of sawdust versus one cubic yard of watermelons. The accepted average for food scraps is 1000 lbs per cubic yard.

Container or Volume of food scraps	Average Weight, full (varies based on the material)	Average number (full) / cy	Average number (full) per 42 cy	Number collected per week to reach 42 cy/yr	Average number of households needed to fill container per week
5 gallon bucket	25 lbs	40	1,680	32	2.5
35 gallon tote	175 lbs	6	252	4.8	18
48 gallon tote	240 lbs	4	168	4	25
1 cy	1,000 lbs				
42 cy	42,000 lbs				

## Average Container Capacities

Container		Volume Capacity	Weight Capacity
Full size 18-wheeler semi box truck	Full Load	10-16 cy	10,000-16,000 lbs
Full size 18-wheeler dump truck	Full Load	100 cy	100,000 lbs
Full size truck, 5x8 bed	Full Load	2.22 cy	1,500-2,500 lbs
Compact truck, 4x6 bed	Full Load	1.33 cy	1,000-1,500 lbs
Wheelbarrow, 6 cubic feet		0.22 cy	Ability to push load
Compost bin	3'W x 3'L x 3'H	1 cy	
	4'W x 12'L x 3'H	6 cy	

## VAAFM Agricultural Residuals Management Program

Note to readers: More changes are coming. Stay tuned!

[Act 41](#), passed in 2021, amended the definition of “farming” under [Act 250](#) and in the Required Agricultural Practices to include “the importation of 2,000 cubic yards per year or less of food residuals or food processing residuals onto a farm for the production of compost, provided that:

- (1) the compost is principally used on the farm where it is produced; or
- (2) the compost is produced on a small farm that raises or manages poultry.

It places regulatory jurisdiction of these small on-farm composting operations with VAAFM. The Act also introduces new requirements to register soil amendments, which includes compost products sold in Vermont.

The rule making for this program will begin on or before January 2022, and VAAFM will file a final proposal for rules no later than January 2023. Until rules for this program are established, current guidelines set out by ANR are in effect.

## **Act 250**

[Act 250](#) is Vermont's Land Use and Development Law. There are exemptions in Act 250 that relate to on-farm composting. These exemptions aim to clearly define when on-farm composting is considered development subject to Act 250 (most agricultural activities are **not**). Farms can generally assume that if their primary source of farm income is farming (not composting), and if they fall under the exempt or Small Composting Facility scale thresholds, they will also be exempt from Act 250. There are other exemptions and it is always beneficial to have documentation of the exemption directly from the State. To determine whether you need an Act 250 permit, contact your [Act 250 District Coordinator](#).

Note: As operations grow, their exempt status can change, so it's important to know where the line falls between exempt and non-exempt.

## **Municipal Regulations**

Local municipalities, such as your town government and your local solid waste management entity, have some oversight of solid waste management operations that may be applicable to on-farm composting, depending on the location of the operation and whether the scale of the operation is regulated as a farm or as a waste management facility.

The extent of this oversight varies by town, so start by contacting your town clerk to help you understand local zoning regulations and what permitting and permissions may be required for your particular site. For example there may be local zoning setbacks from roadways, property borders or streams.

Next, contact [your solid waste management entity](#) to understand any rules under their purview. A letter from the local solid waste planning entity stating that the facility is acceptable under its plan must be submitted to ANR if you are applying for registration (small compost facility) or certification (medium or large compost facility).

Additionally, under the [ANR Rules](#), small, medium and large composting facilities must also provide a copy of the registration or certification and the facility management plan to the municipality and to the [solid waste management entity](#) where the facility is located.

## Required Agricultural Practices (RAPs)

Water quality is critical to everyone. The Required Agricultural Practices (RAPs) establish practices and management strategies to protect water quality. The RAPs apply to anyone farming four or more acres or earning \$2,000 or more annually from the sale of agricultural products. Any activity that adversely impacts water quality would be subject to a violation of RAPs. In the context of composting, sites must be managed in a way that does not adversely impact water quality or present a nuisance to neighbors. For more details refer to the [RAPs summary](#).

## Organic Certification

Certified organic farmers have special regulations around composting and using compost on crops. The National Organic Program (NOP) compost and manure guidelines were designed to ensure thorough pathogen destruction in raw feedstock and to prevent the application of prohibited synthetic compounds on certified farms. Any farm that wishes to use compost in organic production should avoid all compostable or biodegradable plastics, which are considered synthetic. Certified organic vegetable and small fruit producers who wish to use compost within the harvest interval of their respective crops (90 or 120 days depending on the crop) need to meet NOP compost requirements on their farms.

**“Composting can be a great way to build soil and bring necessary nutrients onto your farm! Only allowed feedstocks can be used if compost will be used on an organic farm, although that includes non-organic plant materials like hay or straw. You can learn more about what feedstocks are allowed at [www.OMRI.org](http://www.OMRI.org) and we at VOF are happy to help you address any concerns!”**

- Nicole Dehne, Certification Director of Vermont Organic Farmers

As a general practice, whether certified organic or not, it's important that everyone who is making compost for use on their farm or for sale understands the Process for Further Reducing Pathogens ([PFRP](#)), meaning that **the material must reach a minimum of 131 degrees Fahrenheit** for the appropriate amount of time depending on the system, for food safety, and weed and plant pathogen control. If temperature records are not kept, the compost must be treated the same as raw manure. If compost only contains plant wastes, it may be used any time as a soil fertility building side-dressing.

Compost production records should include the type and source of all feedstock materials as well as a record of compost temperatures. Three types of materials are allowed: raw manure, composted plant and animal materials, and uncomposted plant materials.

Each substance carries a restricted or unrestricted status depending on its nature and how it was produced.

Certified organic farms must follow the National Organic Program NOP Guidance. [Section 5021](#) covers the production and use of compost and vermicompost.

If you want your compost to be approved for use on certified organic farms in Vermont, contact [Vermont Organic Farmers](#) (VOF) at 802-434-3821 to schedule a site visit.

## Organic Standards Summarized

- Compost production records should include the type and source of all feedstock materials.
- Composting Temperature Requirements:
  - When animal materials are used in compost production, the certified operation should maintain temperature monitoring logs, and document the practices used to achieve uniform elevated temperatures.
  - Materials can be managed in windrows, static aerated piles or any other management system that achieves the minimum time and temperature requirements.
  - Records must be kept for all compost applied to cropland showing that all of the composted materials were managed to achieve a minimum temperature of 131°F for a minimum of time requirement. For example, all areas of a compost pile must achieve the minimum temperature of 131°F for a minimum of three days.
- Organic matter (finished compost) must be applied in a manner that prevents contamination of crops, soil and water.
- NOTE: feedstocks do not have to be organically grown. For more information on NOP implications of different types of feedstocks, see the chart on page 41 of this guide.

## FSMA Produce Safety Rule

Farms with over \$25,000 in annual sales of produce (fruits, vegetables, mushrooms, herbs, or nuts) may be subject to the federal Food Safety Modernization Act (FSMA) [Produce Safety Rule \(PSR\)](#). The PSR has requirements in [Subpart F](#) related to “biological soil amendments of animal origin,” or BSAAO. BSAAO includes compost made from feedstocks derived from animals such as manure or **any** post-consumer food scraps including solely post-consumer vegetable waste. The PSR requirements include specific measures to prevent contamination of produce from human pathogens that may be present in BSAAO:

- storing and handling amendments safely to avoid cross-contamination;
- using validated treatment processes such as turned or aerated composting following specific process controls (e.g. time, temperature) to reduce potential pathogens;
- using application methods that minimize potential contact of amendments with produce;
- following required application-to-harvest intervals for “treated” and “untreated” amendments on produce crops; and
- keeping records on treatment process controls.

The Vermont Agency of Agriculture, Food & Markets (VAAFMM) [Produce Program](#) helps farms determine their status under the PSR and meet regulatory requirements and best practices for produce safety. Learn more at [agriculture.vermont.gov/produceprogram](http://agriculture.vermont.gov/produceprogram) or contact the Produce Program at [AGR.FSMA@vermont.gov](mailto:AGR.FSMA@vermont.gov) if you are unsure whether or how the PSR applies to your farm.

If you provide finished compost to a farm subject to the Produce Safety Rule, the farmer may ask you for a Certificate of Conformance or other [documentation](#) that states:

- the process used to treat the compost is scientifically valid and has been carried out with appropriate monitoring; and
- the compost has been handled, conveyed and stored to minimize the risk of contamination by an untreated or in process biological soil amendment of animal origin.

# Considerations for Feeding Animals Food Scraps

Act 41 makes it clear that allowing poultry to forage on food scraps and active compost systems meets the definition of farming (compost foraging) at a certain scale. Jurisdiction will switch from ANR to VAAFMM for farms that are composting no more than 2,000 cy per year of food residuals once the rules are established. The interim ANR rules for small composting facilities will apply to all involved in this practice until VAAFMM adopts rules, no later than January 1, 2023.

While farm animals may or may not be allowed access to forage on food scraps, depending on type of animal and type of food scrap, food scraps are **not** considered “animal feed”, unless registered as a commercial feed.

The restrictions for providing animals food scraps are as follows:

**Swine:** VAAFMM has regulates what can be fed to pigs being raised for market. No meat products are allowed, nor any post-consumer food scraps, including cooked food. For more details see the [VAAFMM Guide on Feeding Food Scraps to Pigs](#).

**Poultry:** Chickens may be given any food scraps, including meat. [DEC Universal Recycling FAQ - Businesses/Institutions](#).



## Case Study:

### Willow Tree Community Compost and Sunrise Farm

In 2019 [Willow Tree Community Compost](#) partnered with [Sunrise Farm](#) to help close the nutrient loop in the Upper Valley of Vermont in advance of Vermont's Universal Recycling Law, Act 148. The partnership takes food scraps from the community and transforms them into compost. The compost then feeds the farm's soil which in turn feeds the community.

Willow Tree expanded their curbside food scraps pickup service in the five villages of Hartford (White River Junction, Wilder, Quechee, West Hartford and Hartford Village neighborhoods) and began delivering food scraps to Sunrise Farm for their new on-farm compost system.

The partnership has enabled Willow Tree Community Compost to accept more customers and has deepened the farm's connection to the community by creating a welcoming place for the Farms' CSA (Community Supported Agriculture) members and customers to drop off food scraps and see an example of community-oriented composting that enhances soil fertility on the farm.

Sunrise Farm is a certified organic, diversified CSA farm managing vegetables and livestock. In accordance with [USDA National Organic Program \(NOP\)](#) standards, all organic waste is managed to

meet the NOP's heat treatment requirements. When starting their composting system, the farm chose an aerated static pile (ASP) system, because the NOP and ANR requires the system to maintain at least 131°F over at least three days in ASP composting systems, rather than maintaining that temperature through five turns over at least 15 days as required for a turned windrow system. (The turned windrow standard is more labor intensive and can be more difficult to achieve consistently.)

At first, Sunrise Farm was aiming to stay beneath ANR permitting thresholds. Ultimately, the composting project increased farm fertility and added value to their CSA program, incentivizing the farm to increase the scope of the project. Although the volume of food scraps currently managed on the farm is akin to a small facility (less than 2,000 cy per year), the composting site, which also houses a solar array, is located over bedrock. As a result, a covered concrete slab, roof, and medium facility permit was required to adequately address runoff and drainage issues.

**“The compost building makes it so easy to see what’s happening... old food becoming new food.”**

- Chuck Wooster,  
Sunrise Farm

When the farm decided on this model, they saw the advantage of combining two functions in one facility. By covering the compost shed roof with solar panels, the farm created what farmer Chuck Wooster calls a “carbon management facility.” The size of the facility will enable the farm to increase the volume of food scraps they manage over time as community support for the composting project strengthens.

Their compost area is on the main farm so they also want it to look fabulous, and to be clean and accessible. CSA members have the added value of access to a place to deposit food scraps back into the farm energy loop. In commitment to wildlife stewardship the farm has added measures such as electric fencing and bird netting to keep wildlife from accessing the compost area.



## The Business Plan

Many farmers are concerned about the additional costs associated with starting an on-farm composting operation. As with any new enterprise, costs include time, personnel, and supplies to develop systems. But once in place, and when farm finances are looked at holistically, farmers can begin to see ways to make it not only work, but to add economic value as well as social and environmental value.

The majority of farms purchase and import some sort of fertilizer to support soil fertility on their farmland. Starting a compost operation can be considered a shift in costs, although depending on when they start and the type of compost system selected, this may take a season or two to fully realize.

There is also potential revenue to be realized from accepting food scraps at your farm, called ‘tipping fees’, depending on the overarching model farmers assume, and from selling finished compost (although selling more than 50% of compost instead of using it on-farm has different regulatory implications).

Once in place, on-site composting can also offer potential for some farms to shift part-time or seasonal employees to full time to help manage the compost system, benefiting employees and the farm alike in terms of employee retention.

Finally, farmers may value the additional community connections

and customer relationships that come from offering this service, much as marketing expenses or community service have a role in the business plan despite not generating income directly.

## **On-Farm Composting Component Sample Budgets (for on-site drop-off station)**

Expenses will vary greatly depending on the volume of materials, type of composting system, and method of collection. A low-cost system might accept food scraps on the farm and manage a pile; a high-cost system might build a facility and partner with a hauler.

Below is an example of a break-even budget for a small (~5 acres) CSA farm with 200 customers, with a food scraps drop-off bin and a low-tech pile or windrow composting system on site.

### **Expenses, Break-Even Example:**

<b>Item</b>	<b>Cost</b>	<b>Units</b>	<b>Total</b>
Labor: washing bins, pile management	\$20/hour	4 hrs/week (208 hrs/yr)	\$4,160
Washing station supplies	\$500		\$500
Brought-in feedstocks: woodchips (if needed)	\$150/cy	5 cy	\$750
Totes (e.g. 32 gallon, for collection) with wheels	\$75	10	\$750
Education, signage	\$100		\$100
<b>TOTAL</b>			<b>\$6,260</b>

### **Income, Break-Even Example:**

<b>Item</b>	<b>Cost</b>	<b>Units</b>	<b>Total</b>
50% cost savings on fertilizer <sup>1</sup>	\$50/acre	5 acres	\$250
Per customer tipping fee	\$30	200	\$6,000
<b>TOTAL</b>			<b>\$6,250</b>

<sup>1</sup> Based on a 5 acre farm and \$100/acre in fertilizer costs without compost.

As a compost system management becomes more efficient, or the volume of customers or food scraps increases, you might consider expanding the operation. Some additional potential costs and revenue to consider are listed below.

**Additional Expenses:**

A rough estimate of one-time potential add-on expenses (capital improvements)

Item	Cost	Units	Total
Bucket loader bucket (separate from field) - optional one time purchase	\$1,000	1	\$1,000
Concrete pad		Estimated size 20' x 30'	\$4,000
Roofed shed for half of the pad			\$20,000
ASP system upgrade			\$1,000
<b>TOTAL</b>			<b>\$26,000</b>

**Additional Income:**

Potential ongoing, add-on revenue

Item	Cost	Units	Total
50% cost savings on chicken feed <sup>2</sup>	\$80/month per 20 birds	12 months	\$480
Sale of finished compost <sup>3</sup>	\$10/5-gal bucket	100	\$1,000
<b>TOTAL</b>			<b>\$7,730</b>

<sup>2</sup> Save 50% of feed costs with compost foraging. Calculated at \$80/month for feed and scratch for 20 birds

<sup>3</sup> Could increase volume and retail price; assuming most compost is used on-farm.

For composters with the right year-round conditions, equipment and access to a populated route or community, on-farm composting can expand into a profitable enterprise, yielding increased soil fertility and decreased off-farm inputs while also providing an income stream. For detailed resources on growing a year-round composting facility at any scale, visit BioCycle.net.

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**Table 2. Annual operating cost projection**

Process	Labor summary		Labor cost	ASP Composting		Total
	Hrs/Day			Machine costs	Utilities	
Waste Receipt	0.7		\$4,734	\$11,572		\$16,306
Grinding/shredding	0.7		\$7,020	\$34,320		\$41,340
Mixing	4.2		\$18,937	\$72,029		\$90,966
Transport to pad	2.1		\$14,913	\$36,453		\$51,365
Building ASPs	2.4		\$17,043	\$41,660		\$58,703
Electricity for ASPs					\$78,122	\$78,122
Moving Compost to Curing	1.5		\$10,439	\$25,517		\$35,956
Managing Curing Piles	1.3		\$9,326	\$22,797		\$32,123
Screening Compost	1.5		\$12,079	\$10,410		\$22,489
Moving Screened Compost to Storage	1.1		\$7,516	\$18,372		\$25,888
Move Overs to Storage	0.3		\$1,879	\$4,593		\$6,472
Product Marketing & Sales	0.8		\$5,616	\$13,728		\$19,344
<b>TOTALS</b>	<b>16.6</b>		<b>\$109,501</b>	<b>\$291,453</b>	<b>\$78,122</b>	<b>\$479,075</b>

Assuming 85% efficiency of site workers, 16.6 hrs/day actually equates to 19.5 hrs/day  
 Total cost of \$479,075 divided by 10,623 annual tons equates to \$45.10 per ton

# Food Scrap Collection

## Rules on Food Scrap Collection

Depending on how and where you are accepting food scraps, you may need to register with ANR as a solid waste hauler.

Sanitary practices are critical. No matter the scale, there may be municipal and/or state action taken if complaints are made or if your collection operation poses a threat to the environment, public health and public safety, or creates a nuisance.

A hauler license is only required by ANR if:

- solid waste is hauled for compensation, AND
- more than 4 cubic yards are hauled at a time (4 cy is equal to 4000 lbs, a full-size pick up truck bed, or 160 5-gallon buckets).

If you are having people bring their food scraps to your site, for example - if your CSA members drop off their food scraps when they come to pick up their CSA share - you do not need to register with ANR.

If your CSA is operated off-farm, or if you collect food scraps from a farmers market (or other off-site event) and transport the material back to your farm, you do not need to register as a solid waste hauler as long as the materials are hauled to the compost site the same day.

If the food scrap materials will be collected and stored onsite (i.e., will not be brought back to the composting location immediately) then a food residuals drop-off registration could be acquired to collect and store food residuals. More details are in the next section.

If you're on the edge of these regulations, or are unsure as to whether or not you need a permit, it's best to err on the side of caution and contact ANR, VAAFAM, and your regional solid waste management entity to ensure clarity.

For more information about hauling volumes of food scraps read the [Hauling Waste without a Permit brochure](#) and visit [dec.vermont.gov/haulers](http://dec.vermont.gov/haulers). You can [apply for a hauler permit online](#).

## Food Scrap/Residuals Drop Off Registration

If you're looking to have a permanent food scraps collection point **not** on your farm, you may need a registration which allows an operator to manage **less than** 144 gallons of food scraps/residuals per week in accordance with [Subchapter 12 of the Solid Waste Management Rules](#). Think of these as mini transfer stations. You need one only if the material is being collected in a location for transfer to another approved management location. If you already have a composting registration or certification, then a food scraps-food residuals drop-off registration is not necessary.

You can fill out the [Food Residuals Drop Off Registration Form](#) online.

## Door-to-Door Collection Component Sample Budget

The previous sample budget assumes customers will drop off food scraps. However, you may also choose to integrate a food scrap collection component, which may make your service more appealing to a wider variety of customers. This may be something you (the farm) chooses to operate yourself, or you might partner with another local business as in the example of Sunrise Farm and Willow Tree.

As a hauler, you can set the geographic radius that you will serve. As you determine a route, it's important to calculate a reasonable travel distance within your budget, stacking functions whenever possible. For example, if you already deliver wholesale farm products to stores, restaurants or farmers markets, your collection route can be based on those regions, as long as food safety considerations are adequately addressed in your hauling setup. If you make regular trips to town for supplies, a route might be based on those locations. If your farm is near a population center, starting with the neighborhoods closest to your farm may be the best fit.

The example below outlines a framework of costs to consider to start up a collection business.

## Expenses, Door-to-Door Collection Example

Item	Cost	Units	Total
1 gallon screw-top kitchen food scrap containers <sup>4</sup>	\$5	200	\$1,000
Lids for 5-gallon buckets (screw on)	\$8	500	\$4,000
Buckets, 5-gallon	\$8	200	\$1,600
Advertising & education	\$2,500	annual	\$2,500
Employee salary <sup>5</sup>	\$20/hour	348 hours	\$7,680
Equipment repair	\$500	annual	\$500
Equipment supplies	\$500	annual	\$500
Fuel	\$3,000	annual	\$3,000
General supplies	\$500	annual	\$500
Vehicle	\$20,000	One-time capital expense	\$20,000
Hot water pressure washer	\$2,000	One-time capital expense	\$2,000
Trailer with modifications for hauling	\$2,000	One-time capital expense	\$2,000
Capital improvements at site	\$2,000		\$2,000
Totes (e.g., 32 gallon, with wheels)	\$75	10	\$750
Sales tax (kits sold)	\$300		\$300
Vehicle maintenance	\$1,500	annual	\$1,500
<b>TOTAL</b>			<b>\$49,830</b>

<sup>4</sup> For customer homes

<sup>5</sup> One employee, 8hr/week, year-round. Not including tax/insurance

## Income

Income, or reduced costs, may come from a number of different sources. Some examples that would break even or return a profit based on the expenses outlined in the previous example:

### Income, Door-to-Door Collection Example

Item	Cost	Units	Total
Gross collection fees, 200 customers	\$20/mo	2400	\$48,000
Kit sales (5-gal with screw lid, plus 1-gal countertop pail)	\$25/each	200	\$5,000
<b>TOTAL</b>			<b>\$53,000</b>

If you'd like to scale up your composting operation but do not want to launch a collection service, consider finding a local hauler entrepreneur who would like to start a business and partner with your farm. This can generate revenue if you collect a tipping fee from the hauler or sell the finished compost as a value added farm product, or can reduce expenses by using the finished compost on your fields instead of purchasing fertilizer.

### Income, Tipping Fees Example

Item	Cost	Units	Total
Tipping Fee	\$70/ton	46 tons/year <sup>6</sup>	\$3,220
<b>TOTAL</b>			<b>\$3,220</b>

<sup>6</sup> Example assumes hauler has 400 customers producing one 5-gallon bucket per month (average weight 25lbs), equalling a total volume of 4 tons/month.

Adding a compost operation may also provide additional financial benefits that are hard to quantify, such as building community connections and thus reducing marketing costs or increasing customer volume.

Managing an on-farm compost system or creating a community food scraps collection service is a manageable enterprise and

provides a needed community service that can turn a profit. Start small and tap into your local community and the existing resources nearby while planning ahead for improved quality, efficiency, and even expansion. Considering all of the possibilities and connections to be made in your community and region will set you on a track for success.

## **Sample Budget/Enterprise Questions to Consider**

- What volume of food scraps can you handle?
- Will you collect on-site only?
- Will you compost on-site?
- Will you partner with a hauler?
- What on-site feedstock materials do you have to start with?
- Can you manage washing buckets? Year-round?
- Where will you base your route?
- Where do you/your employees already travel regularly?
- Where is your customer base?
- Are there restaurants or other food production businesses nearby?
- How does your town transfer station manage organic waste?
- Do you have steady access to feedstock ingredients? Including enough carbon materials ?
- Do you have a place to store dry feedstock ingredients?
- What local regulations might apply to your site?

## **More Resources on Budgets**

- For a more detailed version of the sample food scrap hauler budgets and other capital expense and financing considerations, download the [Small-Scale Food Scrap Hauler Budget Template](#) (by Gary Deziel, Lake Champlain Sea Grant)
- [Composting Business Management: Composting Facility Operating Cost Estimates](#) (from Biocycle)



## Designing Your Operation

There are several ways to manage the composting of organic materials at every scale. The most important thing is to create a system that works for your understanding of composting, your space, and maintains the right balance of carbon-rich and nitrogen-rich ingredients based on the volumes you have access to. As you build your skills, capacity, and community relationships, upgrading to a bigger or more efficient system may be desired. The following chart outlines the most common composting systems.

### Find additional information at:

- **Community-Scale Composting Systems: A Comprehensive Practical Guide for Closing the Food System Loop and Solving Our Waste Crisis** . James McSweeney, [chelseagreen.com/product/community-scale-composting-systems/](https://chelseagreen.com/product/community-scale-composting-systems/)
- **Agrilab Technologies: Efficient compost aeration and heat recovery options for your farm, business, institution, or municipality.** Brian Jerose. 1662 Pumpkin Village Road | Enosburg Falls, VT 05450 | 802 933 8336 | Info@AgrilabTech.com, [agrilabtech.com/](https://agrilabtech.com/)

# On-Farm Composting Methods and Systems

Method & Description	Labor/Time
<p><b>Vermicomposting:</b> Worms, typically <i>Eisenia foetida</i> or <i>Lumbricus rubellus</i>, do the “labor” of turning and maintaining the feedstock material to decompose and generate “waste” or worm castings, high in nutrients.</p>	<ul style="list-style-type: none"> <li>• Low labor, depending on system.</li> <li>• If material is pre-composted, the labor for this system needs to be factored in.</li> </ul>
<p><b>In-Vessel Systems:</b> Use of perforated barrels, drums, or manufactured containers.</p>	<ul style="list-style-type: none"> <li>• Low: building/assembling the system, turning, adding feedstocks, and harvesting materials.</li> </ul>
<p><b>Bin System:</b> Series of wooden or cinder block bins, usually composed of three or four connected bins.</p>	<ul style="list-style-type: none"> <li>• Layering and turning can be labor intensive.</li> </ul>
<p><b>Pile System (Non-aerated):</b> Feedstocks are mixed in a pile &amp; left to decompose or turned infrequently.</p>	<ul style="list-style-type: none"> <li>• Low, if bucket loader used.</li> <li>• Building pile can be labor intensive, depending on volume of materials/pile size, and turning frequency.</li> </ul>

Cost	Other Considerations
<p><b>Vermicomposting:</b></p> <ul style="list-style-type: none"> <li>• Low-moderate, depending on the size &amp; type of the system.</li> <li>• Worm stock investment can be a substantial, depending on scale.</li> <li>• Equipment: worm bins will need to be constructed or purchased; “pre-composting” system, if used.</li> </ul>	<ul style="list-style-type: none"> <li>• Acceptable feedstocks limited; materials must be chopped.</li> <li>• Works well with a bin or pile system for “pre-composting” of vermicomposting feedstocks.</li> <li>• Systems need to be enclosed in a temperature-controlled environment (40-80F)</li> </ul>
<p><b>In-Vessel Systems:</b></p> <ul style="list-style-type: none"> <li>• Varies depending on homemade vs. manufactured; manufactured systems vary in cost depending on size &amp; type.</li> <li>• Equipment: homemade bins require material inputs, or can be purchased; hand tools; electricity/solar access if mechanically powered.</li> </ul>	<ul style="list-style-type: none"> <li>• Simple to use.</li> <li>• Can reach high temperatures for rapid composting of food scraps.</li> <li>• Can be used as initial, active phase of composting, in conjunction with bins or piles.</li> <li>• Less weather sensitive.</li> <li>• Has low odor potential.</li> <li>• Larger systems may require electricity for motors.</li> </ul>
<p><b>Bin System:</b></p> <ul style="list-style-type: none"> <li>• Low cost to build &amp; operate.</li> <li>• Equipment: broad fork; shovel; bobcat/small tractor with bucket, optional. Materials &amp; tools for bin construction or bin purchase.</li> </ul>	<ul style="list-style-type: none"> <li>• Should be at least 3’ by 3’ and no more than 8’ by 8’. Can be sized for hand labor or a small tractor for turning.</li> <li>• Moisture, feedstock management, and aeration are crucial to reach high temperatures.</li> <li>• Good method for small-scale composting with no equipment.</li> </ul>
<p><b>Pile System (non-aerated):</b></p> <ul style="list-style-type: none"> <li>• Low, with existing equipment or built using hand labor.</li> <li>• Equipment: front-end loader or small tractor with bucket is best for labor and time efficiency. Broad fork, if manually turning.</li> </ul>	<ul style="list-style-type: none"> <li>• Feedstocks must be thoroughly mixed with proper C:N to reduce odor potential &amp; for high temperatures.</li> <li>• Should be at least 3’ by 3’ and no more than 8’ by 8’, 3 to 4 feet high; pile size is a function of manual labor ability or size of bucket and how high it goes.</li> <li>• Piles can be located in buildings (or covered) to reduce weather factors.</li> </ul>

<b>Method &amp; Description</b>	<b>Labor/Time</b>
<p><b>Turned Windrow:</b> Compost managed as turned windrows is aerated by physically moving the composting feedstock. Turning provides aeration, rebuilds porosity, reduces particle size, and breaks apart clumps of feedstock which can otherwise become anaerobic.</p>	<ul style="list-style-type: none"> <li>• Low-moderate, if bucket loader is accessible; a function of the size of the windrow and turning frequency.</li> <li>• Labor intensive to manually build the windrow, depending on volume of materials/pile size, and turning frequency.</li> </ul>
<p><b>Passively Aerated Pile/Windrow:</b> Feedstocks are homogeneously mixed &amp; then piled over a series of perforated pipes. Air moves through the piles/windrow via a “chimney effect” – air is pulled into the pipes &amp; up through the materials.</p>	<ul style="list-style-type: none"> <li>• Initial pile construction is labor/time intensive.</li> <li>• Low maintenance.</li> </ul>
<p><b>Aerated Static Pile/Windrow (“Forced Air”)</b> A static pile(s) of compost mixture is built over an aeration pipe or network of pipes connected to mechanical “forced air” system. Cycling air through the decomposing materials 24 hours a day, 7 days a week allows for more direct control of oxygen levels and temperatures which accelerates decomposition of feedstocks and thus the composting process.</p>	<ul style="list-style-type: none"> <li>• Initial pile construction is labor/time intensive.</li> <li>• Low maintenance, system monitoring.</li> </ul>

Table adapted from “[Composting Methods and Systems](#)” by Athena Lee Bradley

<b>Cost</b>	<b>Other Considerations</b>
<p><b>Turned Windrow:</b></p> <ul style="list-style-type: none"> <li>• Low, with existing equipment or built using hand labor.</li> <li>• Equipment: front-end loaders or tractor with a bucket, or windrow turner; broad fork, if manually turning.</li> </ul>	<ul style="list-style-type: none"> <li>• Elongated piles (4' – 6' high, 3-12' wide) ensure sufficient air movement through the pile.</li> <li>• Turn when temperatures fall below 120F (1-2/week during the active stage, then less frequently).</li> <li>• Good for composting large volumes of diverse organic wastes, including food scraps, particularly with available equipment.</li> </ul>
<p><b>Passively Aerated Pile/Windrow:</b></p> <ul style="list-style-type: none"> <li>• Low, with existing equipment or if constructed by hand.</li> <li>• PVC piping.</li> <li>• Straw, compost, wood shavings, fabric cover, and/or wood chips.</li> <li>• Equipment: front-end loader or small tractor with bucket is best for labor and time efficiency; broad fork, if manually turning.</li> </ul>	<ul style="list-style-type: none"> <li>• Perferated pipes spaced ~1 foot apart on a 6-9" base of compost or straw. A light layer of wood chips between pipes &amp; feedstocks helps prevent the pipes from plugging.</li> <li>• Minimum 3' by 3' and can be up to 15 feet wide by 6 feet tall, depending on equipment.</li> <li>• A 2-6" cap of finished compost, wood shavings, or fabric cover insulates and controls odor.</li> </ul>
<p><b>Aerated Static Pile/Windrow ("Forced Air")</b></p> <ul style="list-style-type: none"> <li>• Low to moderate, depending on forced air system size and type and, with existing equipment or if constructed by hand.</li> <li>• PVC piping.</li> <li>• Straw, compost, wood shavings, fabric cover, and/or wood chips.</li> <li>• Equipment: front-end loader or small tractor with bucket is best for labor and time efficiency; broad fork, if manually turning; Aeration system: blower(s); timer system; and, motor scaled for the system needs; Grid or solar power.</li> </ul>	<ul style="list-style-type: none"> <li>• Piping and pile/windrow configured similar to that used in passively aerated systems, is attached to one or more mechanical "supplemental" blowers (operated by a timer) powered by a motor (grid or solar).</li> <li>• Design and maintenance of the air-flow system, the need for homogenous mixing and appropriate • C:N ratios at the start, issues with moisture loss, and a power source are considerations for aerated pile systems.</li> <li>• An excellent, scalable process for managing food scraps for rapid decomposition.</li> </ul>

## Customer Relations

As mentioned above, starting locally or on a regularly traveled route is the most likely and accessible place to find customers. Start small to craft your compost recipe right, and to get your systems and resources in place.

If you're composting on-site, working simultaneously to build up a variety of reliable sources of feedstock materials - especially high-carbon sources - as your business grows will be critical to your success.

As you develop a customer base, clearly communicate about what is and is not accepted in your collection bins. Effective source separation of trash from food scraps will result in a higher quality product. Poor source separation will lead to compost full of visible and non-visible contaminants. The end result will depend on the type and quality of education and enforcement implemented to support separating waste from food scraps at the source.

Consider whether or not you will accept meat scraps, liquids, wood products, paper products, and "single-use compostables." Will you require customers to remove produce PLU stickers? Whatever your criteria, having clear educational signs will be critical to success. See Tips for Managing Contamination on page 44 of this guide.

**“Contamination of food scraps is a preventable problem. When it occurs, operators risk feeding nonfood materials to hens, spreading trash on their farm, selling compost with trash in it, and potential health risks associated with microplastics in a low-pH, high temperature and moisture environment. Effective source separation of trash from food scraps will depend on the type and quality of education and enforcement implemented to support it. We see these challenges as an exciting opportunity to build greater literacy across our community about how to steward resources and organize ourselves in more effective community-scale systems.”**

- Black Dirt Farm, [Feeding Community Food Scraps to Laying Hens in an Active Composting System](#), March 2017

## Here are some good places to look for customers:



### **CSA members**

CSA members or otherwise regular customers from your local community know your farm the best and can be a great starting point to build a base. Be aware of potential biosecurity concerns with people coming onto the farm with food scraps from off farm and other potential contamination.

### **Community**

Your immediate neighborhood is a logical place to reach out to build a customer base. Next would be along the route of your regular deliveries, markets or shopping.



### **Curbside bin**

If you have the right location, some farms and composters have had success by leaving a collection bin at the end of the driveway or in an otherwise accessible public place for community members to drop off food scraps. This could be a free service (since it saves on labor) or with an honor-system cash drop box.



### **Curbside pickup**

Once you have a good pressure washing system and enough buckets to provide clean ones as you pick up full ones, a curbside collection service can be fruitful!

### **Local grocers, farms, farm stands**

Any place that sells produce will have waste, often in bulk volumes and free of any post consumer contact. Stores will often welcome a regular, consistent and clean removal of organic waste.

## Office buildings and condominiums

Anywhere people eat regularly is a place to collect organic waste. Condominium complexes or apartment buildings are a way to get volume from a single stop. Office buildings, Town Hall, food shelves, parks, entertainment venues are all worth considering, especially if they're on your traveled route.

## Restaurants

Local restaurants are a way to get more materials with fewer stops. Restaurants, coffee shops and bakeries also need to manage (kitchen and post-consumer) food waste in accordance with the law and are usually looking for an easy way to do that.

## Schools

Schools and institutions produce lots of food waste regularly, both pre consumer scraps from the kitchen and post-consumer scraps from the cafeteria and classrooms. Collecting from schools is often a welcomed service, saving them money from waste removal fees. It's important to have a clear system in place with the food service and maintenance teams at schools to ensure that materials are source-separated, bins are clean and well-managed and that pickups happen in a timely manner.

## Town transfer stations/recycling centers

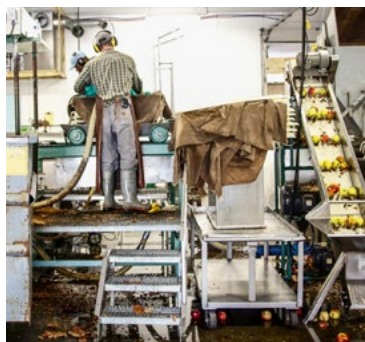
All Vermont town transfer stations are required to have a collection bin for food scraps, including meat and bones. Some towns charge a fee to deposit, some don't. While some



**“We started collecting food scraps from the local school and general store as a service to help the community comply with the law. One of our off-farm jobs is maintenance lead at the school so the service is a natural fit and returning composted nutrients to our field just makes biological sense!”**

- Shannon Varley,  
Strafford Village Farm





**“Our partnership with Sunrise Farm has been invaluable to starting this business. It allowed me to keep my start-up costs relatively low by only focusing on the hauling side of composting and have the flexibility to grow the business at my own pace. But most importantly it put the connection between community and growing local food at the forefront of the business model.”**

- Jen Murphy, Willow Tree Community Compost

towns have developed contracted services to manage the waste, all towns are in need of ongoing community partnerships to manage the weekly volume.

### **Food processing residuals**

If you have access to food production facilities and can handle the consistent volume, it might be beneficial to build relationships with those producers. Examples of processing residuals from food production include apple pomace; liquid effluents such as whey from cheese, yogurt and/or tofu production; liquids from dairies, breweries, oil mills, bakeries; and effluents from equipment washing, etc.

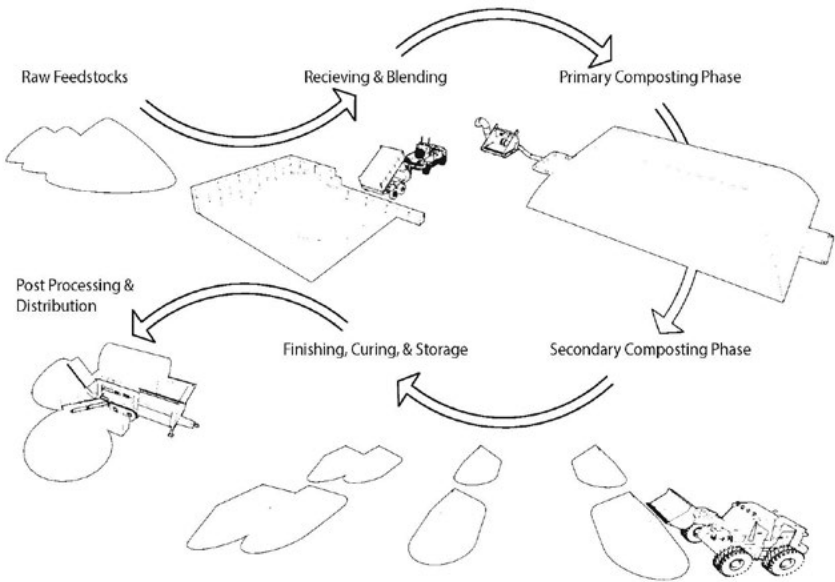
### **Advertising Your Services**

If you already have a farmstand, email list, newsletter, or social media accounts associated with your business, those are the likely places to reach your most loyal CSA members and regular customers. Hanging posters on community bulletin boards or reaching out directly to your town recreation department, recycling center or transfer station, food co-ops and grocery stores, community gardens and other recreation centers will

expand your reach. Advertising on local community listservs or forums, or contacting other local farms, restaurants, and other food scrap producers are also good tactics for reaching a new customer base.

## Site Selection and Layout

It is critical to have enough physical space and the right kind of space to manage the volume of organic waste, as well as space to manage equipment, feedstock materials and finished compost. These aspects will be a determining factor for the volume that a site can undertake.



### Typical Elements of a Food Scrap Composting Site

*Image reprinted with permission of James McSweeney*

When selecting the site there are a number of components to consider. Ensure that there is enough room to manage materials and potentially grow in scale. At the same time, be conscious of environmental impacts such as water quality or becoming a wildlife attractant or neighborhood nuisance. Some site aspects to consider are:

- Flat area (or slightly sloped, in a beneficial direction)
- Avoid bedrock
- Away from water sources

- Good drainage
- Space to install leachate management such as a vegetated swale
- Space to turn equipment around, ideally not muddy
- Year-round access
- Cement or gravel pad is recommended
- Roofed area is ideal for managing moisture
- Be a good neighbor; be mindful of odors and take precautions to protect birds, bears and other wildlife

## **Seasonal Considerations**

In the north it's important to be thinking about variabilities in weather. Keeping the operation free of snow and ice, preventing frozen lines and keeping feedstock materials dry will make your life a lot easier. Additionally, keep in mind:

- Cover: a roofed area is ideal for managing moisture
- Consistent volume of food scraps materials
- Consistent volume of dry feedstocks
- Consistent moisture in compost
- Cold-readiness of equipment
- Freeze-free washing station
- Plowing access
- Potential need to thaw food scraps



## Where to Get Additional Ingredients

Feedstock materials might come from on the farm or can be imported or collected from within the local community, for example from landscapers, tree services, powerline clearing, building sites and more.

Some farms have a drop-off collection bin on site for customers and neighbors to drop off food scraps. Other farms collect from local stores, markets, restaurants or schools that they have developed relationships with.

It's important to be sure that your materials, whatever they consist of, are free of contaminants such as aggressive plants and critters (such as Japanese knotweed, poison ivy, snake worms and emerald ash borer), and persistent herbicides such as the pyralid class of herbicides.

### Contamination notes:

- Compost pile temperature of 131°F kills insects, pathogen, and other pests.
- Snake worms, often called Asian jumping worms, crazy worms, or Alabama jumpers (*Amyntas agrestis*, *A. tokioensis* and *Metaphire hilgendorfi*) are quickly spreading across the U.S. While hot composting (temperatures above 104 degrees F) kills both cocoons and worms, in practice the worms are very adept at migrating to the cooler sides of the piles or windrows. There is also significant risk of reinfection of cure piles. Solarization (with the edges of the plastic weighted down to prevent escape) of curing of finished compost is an effective means for ensuring that worms and cocoons are killed. For more information, contact Dr. Josef Gorres of UVM at [jgorres@uvm.edu](mailto:jgorres@uvm.edu)
- Report sightings of invasive species: [vtinvasives.org/](http://vtinvasives.org/)
- There is currently no research on remediating pyralid herbicides through composting. For more information see [US Composting Council \(USCC\) fact sheets](#).

**Some potential feedstock ingredient sources include:**

Source	Does it count towards regulatory import thresholds?	Acceptable feedstock for organic farms?	Considerations
Wood chips	Yes, if combined imported amount of these feedstocks is OVER 3000 cy/yr	Yes, if untreated	No pressure treated wood; be aware of possible contamination of invasive snake worms, insects, or plants
Straw or hay			Look for source free of Pyralid herbicides
Sawdust or wood shavings			No pressure treated wood
Leaves			Be aware of possible contamination of invasive snake worms, insects, or plants; avoid grounds that use pesticides
Shredded paper			Yes
Post consumer food scraps	Yes, if combined imported amount of these feedstocks is OVER 42 cy/yr	Yes	Remove fruit stickers
Pre consumer food scraps			

Source	Does it count towards regulatory import thresholds?	Acceptable feedstock for organic farms?	Considerations
Food processing residuals	Yes, if imported amount is OVER 1000 cy/yr	Yes	
Raw Manure	No	Yes, if temperature requirements are met	May trigger RAPS
Livestock bedding	No	Yes	

For more information on acceptable feedstocks for compost for use on certified organic farms, see compost standards at [www.omri.org](http://www.omri.org).

## Where to Find Materials

High Nitrogen (N) sources:

- Livestock operations (manure source)
- Dairy farms (spoiled bales with high ratio of alfalfa, clovers, vetch)
- Dairy farms with separated solids from a manure digester

Food scrap sources (N):

- Town transfer stations
- Food stores and food coops
- Restaurants
- Food trucks
- Schools
- Residential collection
- CSA or community drop-off
- Curbside collection
- Other town or community collection or drop-off site

### High Carbon (C) Sources:

- Wood chips, wood shavings, sawdust
- Lumber yards
- Sawmills
- For more information see [High Carbon Bulking Agents Composting Procedure](#)

### Bedding pack w/ manure (Hay, straw, chips or shavings) (C):

- Horse farms and other livestock farms

### Leaves (C):

- Landscapers/Tree service companies
- Your [solid waste management entity](#) may have suggestions

### Wood chips (C):

- Tree service companies
- Electric companies
- Ash EAB (emerald ash borer) work (hot composting is an approved best management practice for eliminating EAB; contact your [solid waste management entity](#) for more information about accepting these chips)
- Public works
- Utility companies
- Parks & Recreation departments
- Sawmills
- Foresters

### Shredded paper (C):

- Transfer stations
- Schools
- Office buildings



### Value of integrating livestock manure and bedding

Manure can add important plant nutrients (nitrogen, potassium, and phosphorus, collectively known as NPK) to the soil and improve soil quality. Composting raw manure by adding other feedstocks and bedding will aid decomposition and produce a humus-rich finished product with little to no ammonium or soluble nitrate. Composting livestock manure reduces many of the drawbacks associated with raw manure use. It's also less likely to cause nutrient imbalances.

Livestock bedding materials are high carbon feedstocks, bringing air and carbohydrates for the microorganisms. The material is often soaked with biologically active urine and manure, creating the perfect conditions for high-heat loving microbes.

## Managing Contamination

Separation of food scraps from packaging, stickers, rubber bands and plastics at the source is referred to as source separation. It's a term we should all become familiar with and a practice that is critical to healthy soil, water and air. Managing contaminants in imported materials may be a consideration depending on where you get your materials.

**The following are some things to consider to help manage for clean, source separated materials:**

CSA members - If you are collecting food scraps on your farm, your CSA members are likely candidates to participate and provide clean organics. They know you best!

Community scale - Staying local allows for relationship building and good communication regarding what is accepted and what is not.

Compostable products - There are many types of products marketed as “compostable” (different from “biodegradable”) such as utensils, plates, cups and liner bags. Liner bags may help customers get over the yuck factor and divert more food scraps. Alternative linings for household bins could include newspaper or brown paper bags. Compostable products may require specialized management. You will have to decide what kinds, if any, you will accept, how to communicate what you accept in your system, and how you will manage them.

Generator education - ANR's [website](#) has a range of signs, sample brochures and other solid waste management education available.

Signage - Having very clear signs listing which items are/are not acceptable in food scraps collection is an important step in managing contamination.

Screening - Consider screening finished product to remove some contaminants and larger unfinished food scraps/residuals. Screened product is best for resale.

## Reminder for Certified Organic Farms

For detailed information on acceptable ingredients and processes for composting on certified organic farms, see the OMRI compost standards, [omri.org/compost-standards](https://www.omri.org/compost-standards) (Table 1).

## Acceptable Ingredients At-A-Glance

YES	NO	NOTES
All food scraps from vegetable or animals sources		High compost temperatures are required to break down meat, bones, & large amounts of grease or dairy products.
All yard waste including grass clippings, leaves & woody debris		Shredded materials will breakdown quicker.
Manure of all kinds	Avoid pet waste	High compost temperatures are required to kill pathogens.
Barn bedding of all kinds		
Paper products		Best shredded. For recipe control, it's best to avoid accepting paper from the community.
	'Compostable' single-use products such as cups, plates, utensils & straws that look like plastic	Single-use, plant-based, paper-like, fiber-based products compost easily but may throw your recipe off if accepted mixed in with food scraps. Also customers may be confused by the array of single-use product claims that could invite other forms of contamination.
	Invasive/ aggressive plants or critters	Pathogens, pests & plants that spread by root may continue to live in the cooler parts of a compost pile. Hot compost may destroy them.
	Materials treated with herbicides, pesticides, or fungicides	There is at least one class of herbicides (pyralids) that do not break down in compost.
	Fruit stickers or trash	



## Case Study:

### Tamarlane Farm and Kingdom View Compost

Tamarlane Farm LLC, a certified organic grass fed dairy vegetable and beef operation, is owned and operated by Eric Paris and his family. They also own The Freighthouse Market and Cafe and the Mosaic restaurant. The farm transitioned to certified organic farming in 2003, and began a commercial composting operation called Kingdom View Compost in 2005. The vegetables and beef produced on the farm are found on the menus of the two family-owned establishments and are sold at the Freighthouse Market. The food scraps from the two restaurants and market are returned to the farm to be composted, the compost is used as fertility to grow more food, thus creating a natural food cycle.

Kingdom View Compost is an ANR-registered medium-sized waste management facility that accepts food scraps from area entrepreneur haulers. They manage an average of twelve tons of food scraps weekly, from some 40 or so food waste generators (mainly institutions) located throughout the Northeast Kingdom. The farm recently installed an aerated static pile system in their 4-bay facility which nearly doubles their composting capacity.

Other composted materials include wood chips from power line trimmings and tree companies and manure and barn bedding from local horse owners and the county fair. Manure from the farm's livestock barns is also an important ingredient in the recipe.

Finished compost is added to the farm hay fields and pastures; extra is sold to local gardeners.

**“The ASP system surpassed my expectations in terms of functioning as a system to process food waste, animal manure and wood chips to create a top shelf compost. We’ve needed to adjust the blower speed, aeration time, and ingredient ratios a bit to accommodate the faster decomposition rates to create an end product suitable for field application and commercial sale.”**

- Eric Paris, Tamarlane Farm and Kingdom View Compost



## Connecting With Your Community

With Vermont's Universal Recycling Law in full effect in 2020, the phosphorus reduction mandates in the Clean Water Bill (Act 64), and a growing awareness about our collective need to adapt to climate change, communities across Vermont are becoming more interested in supporting food scrap composting and organics management.

On-farm composting may not be able to provide all the composting capacity a community needs to keep food scraps out of the landfill to comply with Act 148. Backyard composting as well as municipal and commercial compost facilities are also important. But on-farm (and other forms of community-oriented and community-scale) composting can be an important piece of the organics management puzzle. In addition to reaching our solid waste management goals, on-farm composting is also a way to support our local food system.

**If all the food disposed of in Vermont landfills were composted instead, it would provide adequate nitrogen to fertilize roughly 8,652 acres of mixed vegetables (for comparison, Vermont has roughly 3,317 total acres of vegetables currently!)**

Communities are likely interested in understanding the number of households that would be able to utilize an on-farm composting facility to meet their organics management needs. While there are many variables for which we only have a rough estimate, this table can provide a general sense:

<b>Facility Size</b>	<b>Estimated Maximum Number of Households*</b>
Exempt (<42 cy/yr)	45-123
Small (<2,000 cy/yr)	2,146-5,857
Medium (<5,000 cy/yr)	5,366-14,669

*\*Notes on these calculations:*

- In 2018, DSM Environmental Services on behalf of VT ANR estimated in its Waste Characterization Study that the average Vermont household generates 559 pounds of food scraps per year.*
- Estimated generation per household is only available by weight (pounds) while permitting thresholds are set by volume (cubic yards). One cubic yard of food scraps can weigh between 600-1,640 pounds. This variation creates the high and low estimates for numbers of households that can be supported.*



## The Value of Compost

Finished compost is a valuable soil amendment on any farm and can be a marketable, value-added enterprise to compliment your farm business.

A soil amendment is defined in Vermont law as “a substance or mixture of substance that is intended to improve the physical, chemical, biological, or other characteristics of the soil, except fertilizers, agricultural liming materials, unprocessed animal manures, unprocessed vegetable manures, pesticides, plant biostimulants, and other materials exempted by rule. A compost product from a facility under the jurisdiction of the Agency of Natural Resources’ Solid Waste Management Rules or exceptional quality biosolids shall not be regulated as a soil amendment under this chapter, unless marketed and distributed for the use in the production of an agricultural commodity.” [6 V.S.A. § 363, (19)].

Soil amendments must be registered annually with VAAFM for a fee of \$85 per marketed product. There are labeling requirements that are evaluated for compliance at the time of registration and annual tonnage reporting requirements, revealing the amounts of each formulation of soil amendment and the form in which the soil amendment was distributed.

Your farm customers and CSA members are likely candidates to purchase your finished compost for their home gardens and house plants. Area garden centers and food cooperatives are another outlet to reach a new customer base.



## Next Steps

Navigating the regulatory landscape can be tricky! We hope this guide has been helpful in understanding what regulations apply to whom and that it inspires more farms and communities to take on managing food scraps and organics recycling to boost our local nutrient cycle and keep our farms thriving.

For more information on the topics in this guide, see these additional resources.

## Additional Resources

### How to Compost (websites):

- [Composting Association of Vermont](#)
- Cornell Waste Management Institute [composting resources](#)
- Institute for Local Self Reliance (ILSR) [composting resources](#)

### How to Compost (printed and printable resources):

- [Feeding Community Food Scraps to Laying Hens in an Active Composting System](#), Black Dirt Farm. March 2017
- [Growing Local Fertility: A Guide to Community Composting](#), Institute for Local Self Reliance (ILSR) and Highfields Center for Composting, July 2014
- [Community Composting Readiness Guide](#), Vermont Community Garden Network
- Northeast Recycling Council, [extensive searchable resources on composting](#).

- [CAV Community Composting](#)
- [Community Scale Composting Systems: A Comprehensive Practical Guide for Closing the Food System Loop and Solving Our Waste Crisis](#), James McSweeney

### **Compost Trainings**

- [Vermont Extension Master Gardener/Master Composter Training](#)
- [Compost Operator Training Courses](#)
- [Maine Compost School](#)

### **Tips for Monitoring Compost**

- [Moisture content](#), Cornell
- [Compost physics](#), Cornell
- [Sample monitoring log](#), Compost Technical Services
- [Pile Monitoring](#), ANR, DEC, SWD

### **Regulatory Landscape of Composting in Vermont ANR/DEC Solid Waste Management Program**

- [Vermont Solid Waste Management Rules](#)  
VAAFMM
- [Act 41 as enacted](#)
- [Animal feeds, seed, fertilizer & lime](#)

[Info sheet on invasive snake worms \(or jumping worms\)](#), developed by CAV in partnership with Dr. Josef Gorres, UVM



## Glossary

**ACP:** Accepted Composting Practices are defined in the ANR Solid Waste Management Rules as accepted practices for small compost facilities [Subchapter 11 \(page 125\)](#).

**ANR:** Vermont Agency of Natural Resources

**VAAFM:** Vermont Agency of Agriculture, Food & Markets

**Aerobic:** Occurring in the presence of oxygen. For successful composting, sufficient oxygen should be provided to keep the system aerobic. This ensures that the composting proceeds rapidly and with minimal odor.

**Anaerobic:** Occurring in the absence of oxygen. Anaerobic composting proceeds slowly and is odoriferous.

**Animal manure:** An organic matter derived from the solid animal wastes, used to improve the soil quality and increase the yield of healthy crops.

**ASP:** Aerated Static Pile

**Bedding material:** usually organic, used by animals to support their bodies when resting, lying or otherwise stationary. (Such as straw, wood shavings, saw dust etc.)

**Bedding pack:** Accumulated bedding materials and manure under covered housing. The farmer using a bedded pack starts with an initial thick layer of bedding, adding more daily or weekly. The herd is housed on the pack during the dormant season, lounging, loafing and eating there. The bedded pack ends up being several feet thick by spring. In the winter, it provides a comfortable place for the herd to spend the cold months, storage for manure, and, after windrowing and composting the pack, a superlative amendment for pastures and hayfields. (UVM Extension)

**Bulking agents:** Also referred to as feedstocks, include any material, such as wood chips, wood shavings, straw or hay added to compost primarily to help create good pore structure for air flow. Often provides part of the carbon source as well.

**Bulk density:** The mass of a unit volume of soil, generally expressed in  $\text{g/cm}^3$ . The volume includes both solids and pores. Thus soils that are light and porous will have low bulk densities, while heavy or compact soils will have high bulk densities.

**Carbon sources:** Referring to dry, high-carbon source feedstock materials (bulking agents) such as hay, straw and woody materials. Sometimes called **brown materials**.

**Contaminant:** Unwanted material. Physical contaminants of compost include glass, plastic, and stones, and chemical contaminants include trace heavy metals and toxic compounds.

**Curing:** The last stage of composting that occurs after much of the readily metabolized material has been decomposed. Provides for additional stabilization and reduction of pathogens and allows further decomposition of cellulose and lignin.

**CSA:** Community Supported Agriculture, a system in which customers pay in advance for food and farm products distributed throughout the season

**Crop residue:** Organic waste or materials left on cultivated land after the crop has been harvested.

**cy:** cubic yards

**cy/yr:** cubic yards per year

**Farm organic waste:** Unwanted organic waste produced as a result

of agricultural activities, such as manures and oils.

**Feedstocks** are all ingredients used in compost, including bulking agents.

**Food residuals:** Source separated and uncontaminated (human-food) material that is derived from processing or discarding of food and that is recyclable. Food residuals may include pre-consumer and post-consumer food scraps. For more information on food residuals, see ANR's factsheet on [Food Residuals Banned from Disposal in Trash](#).

**Food scraps:** Food residuals or household food scraps and waste, pre or post consumer.

**Generator:** In this context, generator refers to somebody who creates waste containing organic materials. Anybody who consumes food also generates, to some degree, food waste.

**In-vessel:** A composting system that takes place in an enclosed container.

**Leachate:** Liquid that drains from the mix of fresh organic matter.

**Liquid manure:** A mixture of animal waste and organic matter used as an agricultural fertilizer, sometimes thinned with water. It can be aged in a slurry pit to concentrate it.

**OMRI:** Organic Materials Review Institute

**Off-farm organic materials:** The same as organic materials but are NOT produced on the farm and are imported from off the farm.

**On-farm organic materials:** The same as organic materials but are produced on the farm rather than imported from off the farm.

**Organic materials:** (often used as feedstocks) Food scraps or residuals, leaf & yard trimmings, garden waste, vegetative farm waste, animal manure and bedding materials, sawdust, wood chips and other forest products.

**Organic solid wastes:** Any solid waste that is a carbon-based plant or animal material or byproduct thereof which will decompose. Examples of organic solid wastes include food residuals, leaf and yard residuals, grass clippings, and paper products.

**Pathogen:** An organism including viruses, bacteria, fungi and protozoa capable of producing an infection or disease in a susceptible host.

**PFRP:** Process to Further Reduce Pathogens, the technical term for the minimum criteria to produce a Class A compost. The composting industry has adopted these criteria for virtually all organic waste materials to ensure that finished compost products are safe to use.

The PFRP criteria for the aerated static pile method of composting are stated as follows:

- Pile temperatures shall be maintained at 131 F or higher for a minimum of 3 days (i.e., piles must be covered to ensure minimum temperatures throughout the pile); and
- Fecal coliform must be less than 1,000 most probable numbers (MPN) per gram total solids (dry-weight-basis); or
- *Salmonella* sp. bacteria must be less than 3 MPN per 4 grams of total solids (dry-weight-basis).

**Processing residuals:** Common liquid effluents include whey from cheese and yogurt production, whey from tofu production, bakery effluent from equipment washing, brewery effluent, oil mill effluent, soda industry effluent, potato processing wastewater, apple pomace sludge, etc.

**RAPs:** [Required Agricultural Practices](#)

**Source separated or source separation:** The separation of compostable and recyclable materials from non-compostable, non-recyclable materials at the point of generation.

**Tipping Fee:** Accepting food scraps/residuals at your farm

**Vegetative farm waste:** Unwanted organic waste produced as a result of agricultural activities (i.e., crop residues, waste silage). Does NOT include pre/post consumer food scraps or food processing residuals.

**Waste silage:** Spoiled silage (hay, grain, straw, etc.)

**Windrow:** Composting mixture formed in elongated piles called windrows. Windrows are aerated naturally through the chimney effect, by mechanically turning the piles with a machine, or by forced aeration.

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**Project Lead:**

Cat Buxton, *Grow More  
Waste Less Consulting*

**Authors:**

Cat Buxton, *Grow More  
Waste Less Consulting*

Natasha Duarte, *Composting  
Association of Vermont*

Ollie Cultrara, *Vermont Agency of  
Agriculture, Food & Markets*

Sarah Danly, *Vermont Sustainable Jobs Fund*

**Enterprise Budgets:**

Gary Deziel, *Lake Champlain Sea Grant*

**Additional Contributors and Reviewers:**

Juan Alvez, *UVM Extension* | Linda Boccuzzo,  
*Vermont Agency of Agriculture, Food &  
Markets* | Athena Lee Bradley | Alex DePillis,

*Vermont Agency of Agriculture, Food &  
Markets* | Kurt Erikson, *Vermont Compost  
Company* | Dennis Fekert, *Vermont Agency of  
Natural Resources* | Ben Gauthier, *Vermont  
Agency of Natural Resources* | Tom Gilbert,

*Black Dirt Farm* | Caroline Gordon, *Rural  
Vermont* | James MacSweeney, *Compost  
Technical Services* | Reed Sims, *USDA*

| Stephanie Smith, *Vermont Agency of  
Agriculture, Food & Markets*

**Thank you to our case study  
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Shannon Varley, *Strafford Village Farm*

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Jen Murphy, *Willow Tree*

*Community Compost*

Eric Paris, *Tamarlane Farm*

**farm to plate**



STRENGTHENING VERMONT'S FOOD SYSTEM