



MULTI-FAMILY UNITS/APARTMENT GUIDE TO COMPOST USE



Santa Monica. New York. Washington, DC. New Orleans


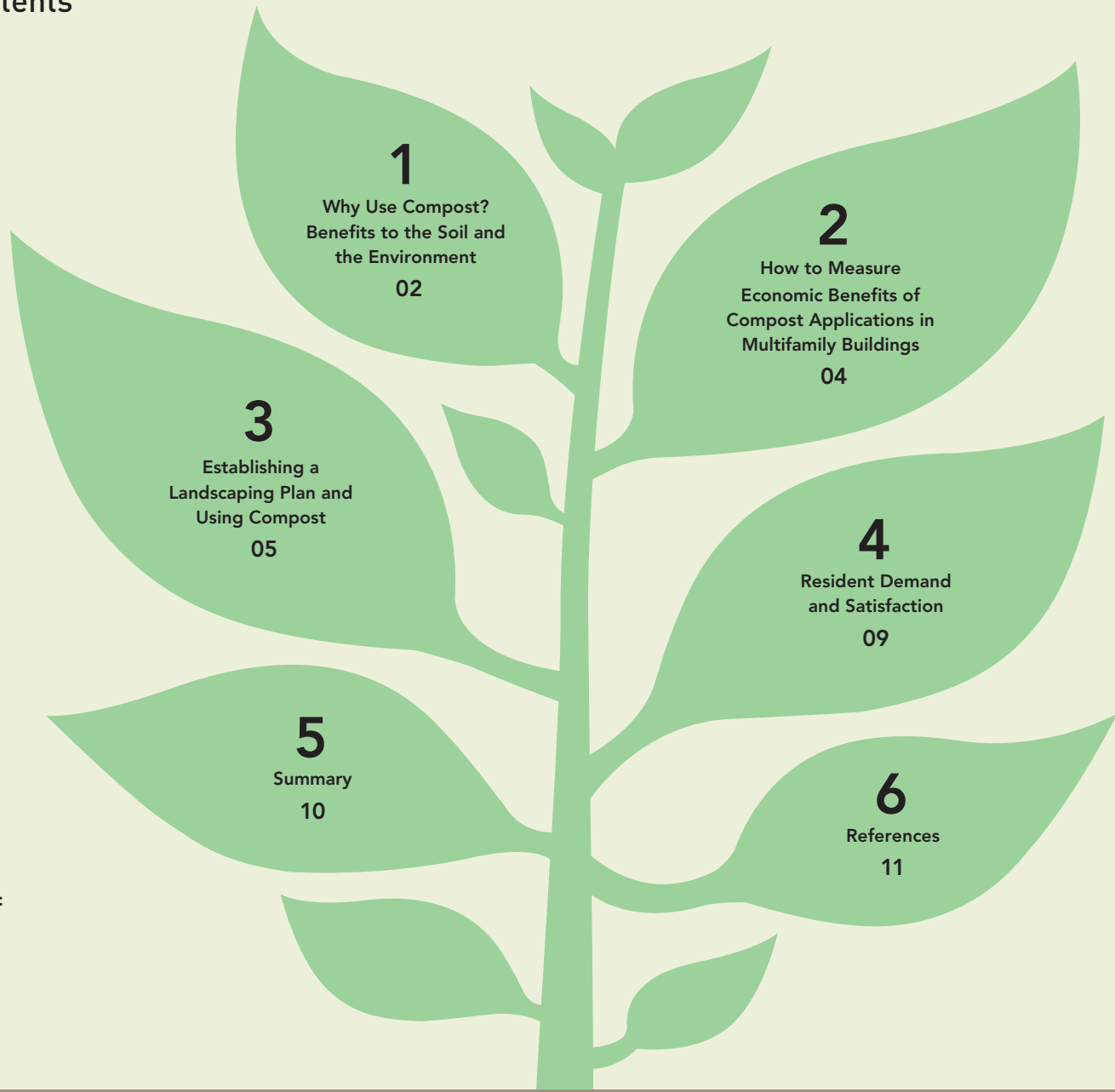


Table of Contents



1
Why Use Compost?
Benefits to the Soil and
the Environment
02

2
How to Measure
Economic Benefits of
Compost Applications in
Multifamily Buildings
04

3
Establishing a
Landscaping Plan and
Using Compost
05

4
Resident Demand
and Satisfaction
09

5
Summary
10

6
References
11

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1. Why Use Compost? Benefits to Soil and the Environment

Background on the Use of Compost

Composting has become a popular method for turning urban generated “wastes” into beneficial and versatile products. It is popular throughout North America and the world. Composting uses natural microbial activity to degrade grass, leaves, food scraps, and other carbon-based materials. The composting process creates a stabilized product rich in organic matter, which is great for gardening, among many other commercial applications. Commercial composting takes place at temperatures of 131°F and higher, eliminating plant and animal pathogens, weeds, and seeds through pasteurization while preserving beneficial plant microbes.

Compost is commonly produced from yard trimmings and



Figure 1: Finished Compost



Figure 2: Composting generating heat which destroys weed seeds

food scraps, but can also be produced from other biodegradable materials, including manure and biosolids.

Two examples of benefits of using compost in apartment building soil are:

- It can benefit the soil quality, increase plant growth and sequester carbon.
- It can be used to show the ‘closed loop’ of nutrients and carbon that includes the food scraps coming from the apartment buildings. Demonstrating the value in “waste” to residents can advance the goal of increasing both participation and the purity levels in the material going into the organics bin.



1. Why Use Compost? Benefits to Soil and the Environment



The Role of Compost in Building Healthy Soil

Compost is probably the most accessible, high-quality and inexpensive product available to improve the physical, nutritional, and biological properties of soil. Compost improves sandy and droughty soils, as well as dense soils with high clay content. It also improves potting mixes, which is why many packaged soil amendments and growing mixes already contain compost. An important note about compost is that it contains significant quantities of stabilized organic matter – the essence of ‘healthy soil.’ This organic matter, which is severely limited in most landscape soils, can do the following:

- Improve the soil structure – improving porosity and bulk density by creating a better plant root environment.
- Increase moisture infiltration and permeability of heavy soils – improving percolation and reducing erosion and runoff.
- Improve moisture-holding capacity of light soils – reducing water loss and nutrient leaching, and helping to conserve water. **WATER LESS**
- Buffer soil pH and improve its nutrient holding capacity – creating a better environment for overall plant growth.
- Provide a variety of plant nutrients – reducing initial fertilizer needs in planting applications. **LESS FERTILIZER**
- Supply beneficial microorganisms to the soil - improving nutrient uptake and suppressing certain soil-borne diseases. **LESS PESTICIDES**
- Act as a food source for beneficial soil microbes.
- Bind and degrade specific pollutants.

Commercially produced compost can be used to improve poor soil, as well as enhance landscape construction and maintenance practices. Today, commercially produced compost is available from coast-to-coast across the US. Compost can be incorporated into a garden bed or planting hole, or be used in larger areas where grass is

to be established. It can also be integrated into the soil profile of an entire site, a practice that is referred to as “topsoil manufacturing”. The compost improves the soil’s organic matter content, improving its overall structure, water retention, and supplies plants and soil microbes with nutrients (the microbes live symbiotically with plant roots).

THESE COMPOST BENEFITS CAN TRANSFORM POOR QUALITY SOIL INTO A HEALTHY ONE.

If you are not convinced that your site soil is of high enough quality, either during the construction or planning phase of your project, then the addition of compost can be used to improve soil quality. In addition, compost may also be applied in maintenance practices or during landscape renovations.

The result of integrating compost into soil also affects climate change by:

- Reducing methane generation – by avoiding the landfilling of organic residuals.
- Reducing the addition of petroleum-based fertilizers and pesticides.
- Reducing water usage – significant energy is used in the distribution of water.
- Helping plants grow – plants use energy from the sun to transform airborne CO₂ to mineral carbon¹. This is the process of photosynthesis which also generates oxygen.
- Positively impacting the long-term carbon cycle.



2. How to Measure Economic Benefits of Compost Applications in Multifamily Buildings



The financial benefit compost application in a new landscape project can be quantified by comparing the materials and installation expenses with the cost of applying traditional topsoil, and other required additives.

$$\frac{\text{Topsoil Installation \& Material Cost X CuYd} - \text{Compost Installation \& Material Cost X CuYd}}{\text{Savings to Landscape Budget}}$$

Here's what this equation means:

Compost can be used to manufacture topsoil on-site. Blending the existing soil with compost on-site will reduce the cost of hauling and disposing of the existing soil (assuming it is not a brownfield site). Compost application can reduce the overall material and hauling expenses.

Landscape professionals often cite the use of compost as a means to improve the success in new plant establishment, and/or dramatically reducing the potential loss of plants during installation. Economic modeling completed on both coasts of the US illustrate that using compost in topsoil manufacturing is roughly 40% to 60% less expensive than replacing poor soil with new soil hauled in. Further, this technique usually yields a soil with 4% to 5% organic matter, which is often difficult to identify and purchase in many regions of the US.

Below are two examples of a compost application generating a savings for the respective landscape project.

Table 1: East Coast example based on an area of 5,000 SF

Option 1 Compost application	Option 2 "Top Soil" application
Install 2" of compost and amend into 6" of existing soil	Install 6" of topsoil Topsoil required
Compost required: approximately 31 CY	approximately 93 CY
Unit price to install and amend compost would be anywhere from \$40-\$45 per CY installed	Unit price would be anywhere from \$30-\$35 per CY installed
Total Cost: \$1,318	Total Cost: \$3,022

Table 2: West Coast example based on an area of 5,000 SF

Option 1 Compost application	Option 2 "Top Soil" application
Compost materials \$25/yard x 31 yards = \$775 + delivery \$280 = \$1,055	"Top soil" application to existing soil: \$34/yard (retail) x 93 CY = \$3,162 + \$680 (consult on trucking fees for actual value)
Compost application, incorporated in the soil, rough grade \$2/sq foot = \$10,000	Application of materials with landscape equipment: \$3.15/sq foot = \$15,750
Total: \$11,055	Total: \$19,592

It is important to note that this "topsoil manufacturing approach" yields the most benefit on larger projects where there is a greater economy of scale.



3. Establishing a Landscaping Plan and Using Compost



Establishing what plant materials are most appropriate for your geographical area and creating a landscape maintenance budget are appropriate steps toward developing an environmentally resilient landscape. Site staff will also need to be responsible for fertilization of the plants, as well as other landscape maintenance practices. These services can also be contracted to an outside landscaping company. Remember, when using certain pesticides or fertilizers, application licenses may be required. If you are uncertain of your soil quality, complete a soil test. Soil tests are inexpensive and only take two to three weeks.

REMEMBER : Always test your soil before starting a landscaping project.

Landscape Practices at Apartment Complexes

Compost can also benefit the landscape operating budget of a multi-family property. The benefits accrue over time from the “topsoil manufacturing” example described previously to an ongoing additive in the landscaping maintenance plan.

The benefits of this approach are shown in the equation below.

$$\begin{array}{r}
 \text{Water Consumption} \\
 + \text{ Plant Costs} \\
 + \text{ Fertilizer Cost} \\
 + \text{ Soil Replacement} \\
 \hline
 \text{Savings to Landscape Budget}
 \end{array}$$

Water Consumed: Compost increases the organic matter content of soil, creating pore spaces in soil that aid in both water filtration and retention capacity. Estimates can be made for each soil and are dependent on the texture of organic matter content of the soil. For example, in California, soil is typically less than 1% to 2% in soil organic matter content. Adding 2 inches of organic matter will typically increase the soil organic matter content to 4% to 5%, and thus increasing its water retention capacity. Given that a 2 inch application will conservatively result in a 2% increase in soil organic matter content, a 1 to 1 ratio is a good rule of thumb when developing a rough estimate.¹

Plant and Soil Replacement: At its worst, poor soil can cause plants to die through insufficient nutrients and poor water retention. The role in compost in building healthy soil (described below) can avoid or defer replacement costs for both plants and soil.

Fertilizer Cost: By building healthy soil, compost can reduce and in some cases eliminate the need for fertilizer. Long-term owners will realize the most benefit from lower operating expenses as these savings accrue over time.

¹ According to Michigan State University, “soil scientists report that for every 1 percent of organic matter content, the soil can hold 16,500 gallons of water per acre of soil down to one foot deep. That is roughly 1.5 quarts of water per cubic foot of soil for each percent of organic matter,” (Source: Gould 2015, Michigan State University). Most composts possess an organic matter content of 30%-70%, with 50%-60% being preferred (source: Alexander, Ron et al, 2001 USCC field guide, page 66).



3. Establishing a Landscaping Plan and Using Compost

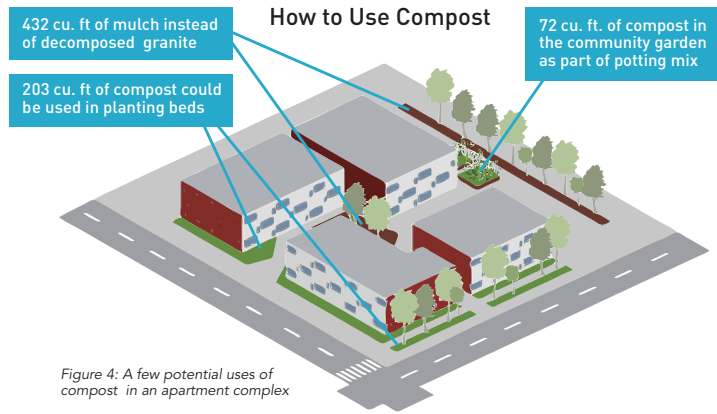


Figure 4: A few potential uses of compost in an apartment complex

Construction Practices (Conventional)

Healthy soil is key for an apartment complex to possess a beautiful, functional and sustainable landscape. A soil which is rich in organic matter, and therefore able to readily absorb and hold water while supporting soil microbes, will make it easier to establish and maintain turf, ornamental landscape plants, and as well as fruit and vegetable gardens. Unfortunately, during the construction process of many homes, commercial buildings, and apartment complexes, the topsoil is removed from the construction site, leaving subsoil on which to build the structure. Although additional soil is often brought back onto the project site in order to establish the landscape, the quality of that topsoil is often substandard or not appropriately suited for the application. When lower-grade topsoil is used in landscape projects, plant establishment is more problematic, indicating that plants may die and maintenance may be more difficult. Further, plants established in poorer soils will require more water and fertilization, driving up maintenance costs.

Compost Applications

1 General Soil Amending, Turf / Planting Bed Preparation:

Use compost to establish grass, annual and perennial flower beds, vegetable gardens, shrubs and any place that requires good soil.

General instructions:

1. Break up the soil in the area to be planted. Cultivate to 6 to 8-inches of depth.
2. Add 1 to 3-inches of compost and mix well with the existing soil.
3. Plant desired plants and seeds (e.g., grass seed, sod, flowers, bedding plants, etc.) and be sure to water well.

Use lower application rates when using composts containing higher nutrient contents and when establishing plants requiring less nutrients. Community gardens may be established using this same method.



Figure 5: Soil amending



Figure 6: 1424 Broadway Community Garden

2 Trees and Shrub Planting:

It is always desirable to do general soil amending, as described above, but that may not always be practical when planting a few shrubs or trees. In such cases, compost can be used as part of a backfill mix and still provide your plants with an excellent growing medium.

General instructions:

1. Dig a hole to the approximate depth of the root ball and two to three times as wide.
2. Mix 1 part compost with two to three parts of the soil removed while preparing the planting hole.
3. Insert plant, backfill with the compost /soil mix and water well.

3 Indoor and Outdoor Pots and Planters:

Mix 1 part compost with two parts of your favorite potting soil.



Figure 7: Planter compost application

4 Lawn Maintenance:

Turf topdressing is a maintenance practice long used by golf course superintendents to maintain a healthy lawn. Compost is ideal for this use.

General instructions:

1. Apply approximately 1/4 to 1/2-inch of compost over the turf area to be treated.
2. Core-aerate the entire area covered with the compost. Ideally aerate deeply (3 to 4-inch minimum), using wide (1/2 to 3/4-inch), hollow tines or spoons. Make four to five passes, moving in two directions over top-dressed area.
3. Back drag the entire area with a weighted chain link fence, or similar appliance, to break up the cores and blend them with the compost to fill in the holes.
4. Overseed if desired, and water well.



Figure 8: Topdresser²

5 Topsoil Manufacturing / Blending:

1. "Pile and Turn" Method

1. Use a shovel or front-end loader to blend compost and most subsoils at a ratio of two to three parts subsoil/low quality soil to one part compost. Inspect and test the subsoil when possible before blending.
2. Give yourself room to work around the entire pile, assuring thorough blending of compost and the subsoil (and potentially, other ingredients).
3. The best way to blend is by creating a bed of soil, then placing the compost evenly on top. The materials should then be lifted and dumped forward (flipped) until the mixture looks uniform.
4. Stockpile, as you would any soil product, for future use.

2. "On Site Incorporation" Method

1. Break up existing subsoil with a shovel, or rototiller – to a 6 to 12-inch depth.
2. Apply a 2 to 3-inch layer of compost evenly over the soil surface.
3. Thoroughly mix the compost into 8 to 12-inch of the subsoil, resulting in a 8 to 12-inch layer of compost "manufactured" topsoil.
4. This newly made, high quality compost "manufactured" topsoil can either be planted into, on site, or harvested and stockpiled for future use.

² Millcreek Manufacturing - Mid-Size Top Dressers



3. Establishing a Landscaping Plan and Using Compost



Buying Compost: What to look for

Generally, 'finished' compost should not resemble the material from which it was derived. It should not look like ground-up brush or other heterogeneous materials. It should have a dark and granular appearance, and the best products often smell like the forest floor. The product may have a mild ammonia scent, but should not have a strong odor. Compost can be obtained in packaged form from garden centers, hardware stores and home centers. Bulk product is most often available at landscape materials yards, directly from composters, and sometimes in garden centers. Most organizations selling bulk compost also have the means to deliver it. The benefit of purchasing compost in bulk is that you can see what you are buying.

However, whether purchasing in bulk or packaged form, make sure that the supplier or manufacturer provides you with application instructions (on packaged products, it should be on the label). And, if desired, analytical testing data for the product.

Always understand the quality of the soil and compost you are working with. The easiest way to do this is by using only US Composting Council Seal of Testing Assurance program certified compost. These compost products are tested regularly, using specialized laboratories, and analyzed for a variety of parameters including pH, electrical conductivity, stability, and maturity among others. For additional information on the STA Program, or to find a list of participants, go to www.compostingcouncil.org (click on 'Programs, then 'STA').



Figure 9: USCC Logo

Compost Estimator

When determining how much compost is needed for a particular project, remember that application rates are usually expressed as a specific "thickness", especially when using the product in bulk form. The charts below provide general application rates to assist in determining the volume of product needed. Keep in mind that the square footage of a planting area is calculated by multiplying the length of the planting area by the width. For example, a 10 ft. x 20 ft. garden bed is 200 ft² in size.

One Cubic Yard of Compost Covers	
648 sq. ft	1/2" depth
324 sq. ft.	1" depth
162 sq. ft	2" depth
108 sq. ft	3" depth

Cubic Yards Required To Cover 1,000 square feet	
1/2" layer	1.5 yd ³
1" layer	3 yd ³
2" layer	6 yd ³
3" layer	9 yd ³

Cubic Yards of Compost Required to Cover a Specific Area³

Formula: Specific area to cover (expressed as square feet) x amount of compost to apply (expressed as depth in inches) x 0.0031 = equals cubic yards of compost to cover a specific area.

$$(\text{___ ft}^2 \times \text{___ inches of compost} \times 0.0031 = \text{___ yd}^3)$$

Example: We are interested in determining the amount of compost necessary to cover 500 ft² with a 2-inch layer of compost. (500 ft² x 2 inches of depth x 0.0031 = 3.1 yd³)

Typical compost application rates for soil improvement in plant and turf establishment and garden bed renovation projects are 1 to 2-inches incorporated to a 6 to 8-inch depth. This application rate yields a 20 to 30% inclusion rate of compost to soil, by volume. Where possible, rototill the soil before applying the compost to determine the incorporation depth that can be achieved; then adjust the application rate as necessary. Horticultural research has shown that this application rate range of compost, depending on the soil conditions and compost characteristics, is often appropriate to improve moisture holding capacity, improve air and .water movement and provide initial plant nutrition.



3. Establishing a Landscaping Plan and Using Compost



Compost and Mulch – They’re Not the Same

Remember, compost is typically incorporated into the soil, which is why it is referred to as a ‘soil amendment’ or ‘soil conditioner’. Materials called ‘mulches’ are used on the soil surface, primarily for water conservation, weed prevention and aesthetic purposes. Interestingly, composts are used as mulches, because they can have an attractive appearance on the ground. Compost provides many of the benefits of mulch, but finely screened compost used as mulch will not significantly suppress weed growth. As the table below illustrates, both compost and mulch are important products in gardening and landscaping, but have different purposes.

Property	Mulch	Amendment Compost*
Moisture conservation	Moderate to high	Low to moderate
Moisture retention	Low (in the mulch) High (in the soil under mulch)	High
Soil temperature	Immediate changes	Slight or unchanged
Soil structure	Changes with time	Changes immediately
Phytotoxicity potential	Low to medium	Low to medium
Root contact	Low	High
Fertility	None to low	Low to moderate
Harbor Pathogens	Low to none	Low to none
Harbor insects / weeds	Low to medium	Low to none
Nitrogen tie up	Low to none	Low to none
Weed control	Moderate to high	Low to none**

*Assumes properly manufactured

**May be improved if using coarsely screened compost as mulch

As listed below, mulch provides both short- and long-term benefits to soil and plants. Its greatest benefit to the landscape sector, however, may be its ability to conserve moisture. This reduces water consumption and related costs, while also acting as an effective weed barrier. Research completed in the US and abroad prove that mulching can reduce the need for irrigation by 25 to 50%. Of course, mulch also degrades over time, providing much needed organic matter to the soil.

Benefits of mulch:

- Conserves moisture
- Moderates soil temperature
- Attractive appearance / decorative
- Reduces weed establishment
- Reduces erosion – conserving soil and organic matter
- Improves micro-organism and earthworm proliferation
- Improves soil structure and fertility over time
- Reduces compaction from traffic
- Reduces plant stresses – assisting in successful establishment
- Protects trees / shrubs from mechanical injury

Mulch whenever possible after planting. Simply spread a 2 to 3 inch layer around trees, shrubs, and flowers. Avoid placing mulch in direct contact with plant trunks and stems.

Modified by R. Alexander from ‘Creating a Healthy Root Zone, James Downer and Ben Faber, University of California’. 1994.



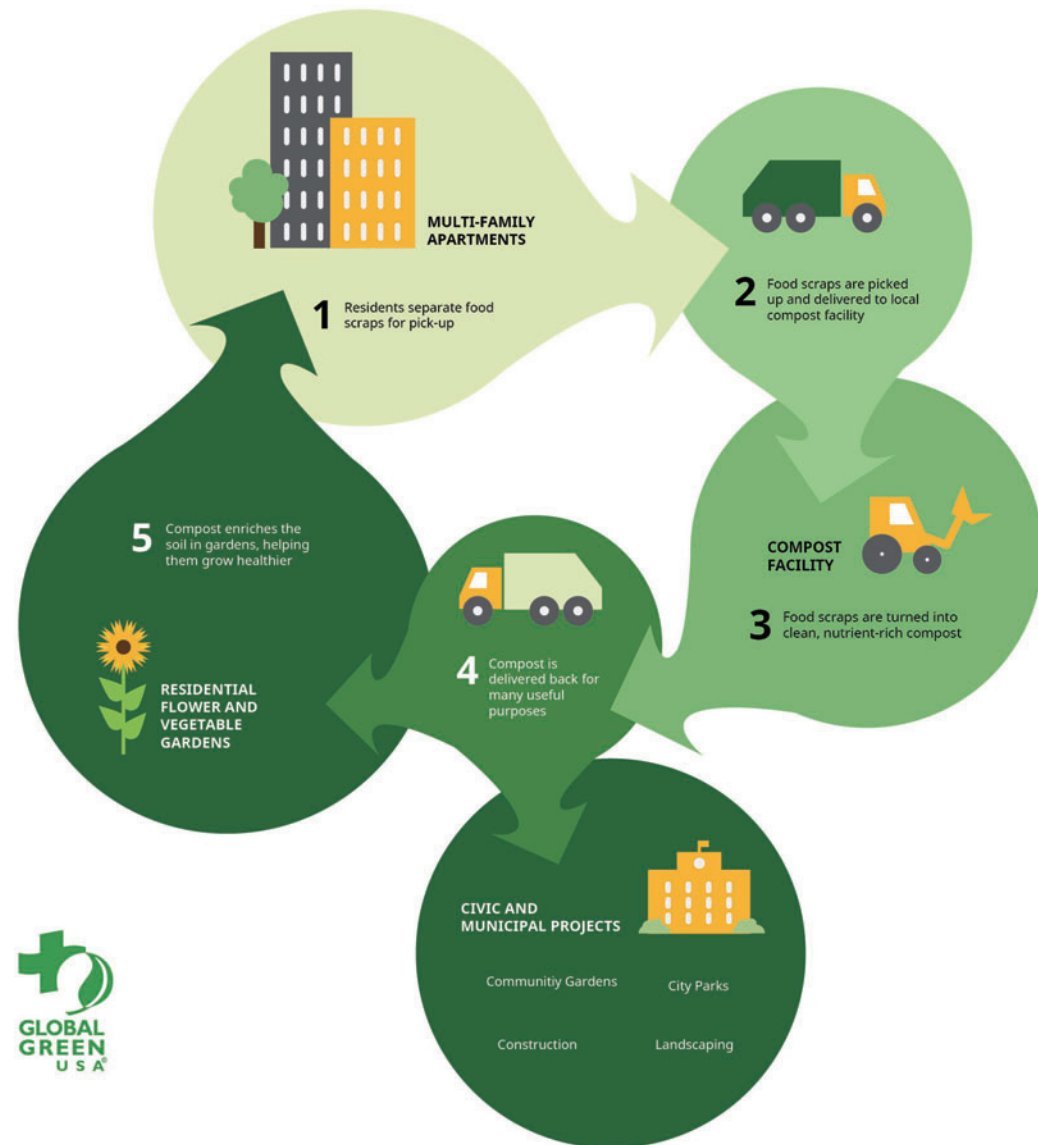
4. Resident Demand and Satisfaction

Compost can be used to show the “closed loop” of nutrients and carbon that includes the food scraps coming from the apartment buildings. and purity levels of the compost going into the organics bin will increase.

Compost is an important product used extensively in gardening, commercial landscaping and farming. However, it is also a recycled product which is manufactured from recovered feedstocks. Accordingly, generators of these feedstocks (e.g., household yard trimmings and food scraps) greatly affect how compost products are produced and their overall quality. With assistance from residents, landscape professionals, and other feedstock generators, the composting industry will continue to manufacture highly effective and environmentally important products.



In Global Green’s project work in 11 cities, staff observed that residents respond positively to the idea of a “circular” use of nutrients from food scrap collection and compost use shown in the figure below. More research is required to determine resident demand for both food scrap collection and compost use, to create best practices for education programs that combine both.





5. In Summary

Remember, compost turns poor soils into healthy soils. Healthy soils help plants establish, grow, and flourish to produce more nutritious food and generate more oxygen. In addition, by using compost, you are also protecting and conserving soil and water... two of mankind's most important resources.



6. References

1. Compost & Climate Connection, Composting Council Research and Education Foundation. December, 2016.
2. Creating a Healthy Root Zone, James Downer and Ben Faber, University of California. 1994.
3. The Field Guide to Compost Use, The US Composting Council. 1996.
4. Chollak, Tracey. Guidelines for Landscaping with Compost-Amended Soils, City of Redmond Public Works. September, 1998.

