



3D Printing Materials Recycling Pilot

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Pilot Program Summary



The Office of Sustainability is sponsoring a pilot to understand the volume of waste that is produced from 3D printers across campus.

This data will help to quantify the environmental impact of this technology and understand the long-term cost of maintaining a 3D Printing Materials Recycling program at Temple University.

We will be utilizing TerraCycle's Zero Waste Box recycling system for 3D printing materials.



Participation in the Pilot



By participating in the pilot, you are agreeing to the following:

1. You will educate lab users about the program to minimize the occurrences of contamination of the Zero Waste Box.
2. You will monitor the container to ensure that it is only used to collect 3D printer waste materials.
3. You will reach out to sustainability@temple.edu when your box is full.

By participating in the pilot, you will receive:

1. Zero Waste Boxes to recycle 3D printing material for one year.
2. Delivery and pick-up of your Zero Waste Box by a Zero Waste EcoRep employed by the Office of Sustainability.
3. Impact reports

Zero Waste Box Program



How does it work?

1. We will arrange to drop-off your first Zero Waste Box at a predetermined date this summer.
2. You can begin collecting waste material generated from your 3D printers immediately.
3. When your box is full, email sustainability@temple.edu to request a pick-up.
4. A Zero Waste EcoRep employed by the Office of Sustainability will switch out the full box with an empty box. After weighing your full box, they will ship it out to TerraCycle for recycling.
5. The Zero Waste EcoRep will send you impact reports at the end of the semester and a final summary report at the end of the pilot.
6. More information about TerraCycle's Zero Waste Box program can be found on the preceding slides.

MORE ABOUT TERRACYCLES ZERO WASTE BOX PROGRAM



Zero Waste Box

TerraCycle[®] is a global leader

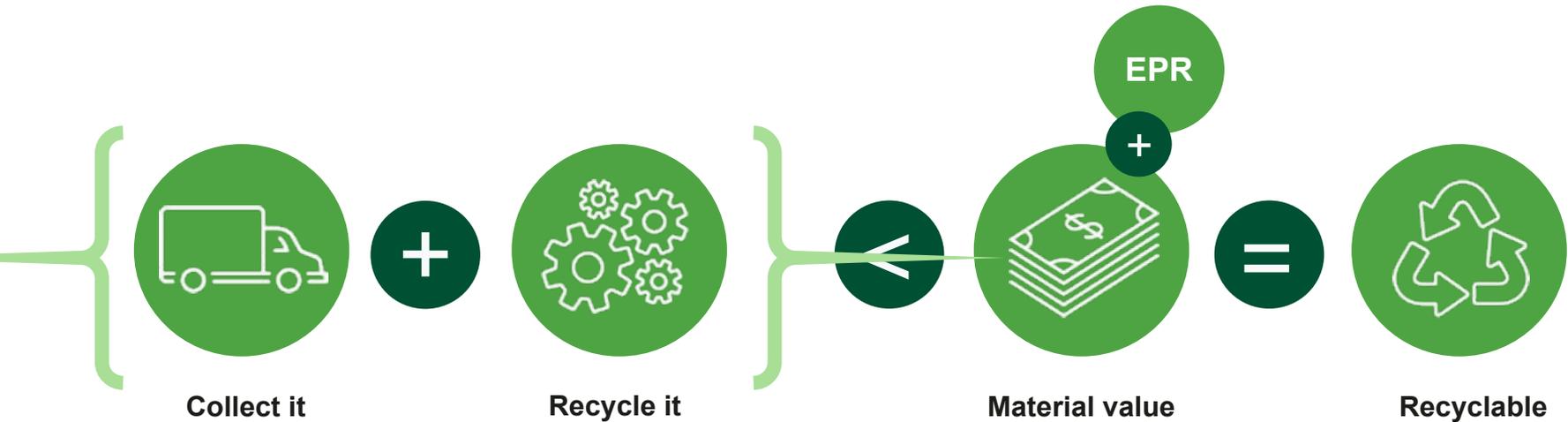


TerraCycle ●

The TerraCycle Foundation ●

What makes an item recyclable?

What creates practical recyclability for a specific waste stream is if the local waste management operator can do so profitably.



The recycling business equation

If the costs of collection and processing are less than the value of the resulting material, the product will likely be recycled.

Traditional waste management companies only recycle what is profitable



How TerraCycle can recycle the hard-to-recycle

Arrows indicate range of driving cost efficiencies



Collection costs

TerraCycle determines the logistics model that best fits a client's needs, including the collection mechanic, incentive structure, and most efficient transportation method.

+



Processing costs

TerraCycle's scientists and engineers develop the technology and process flow to recycle the waste, and work with our network of established vendors to recycle the collected material.

-



Material value

TerraCycle sells the resulting material to companies who use it in new products.

The value of this material does not cover logistics and processing costs, as if it did it would likely be locally recyclable (see prior slide)

=



Client Investment

Collect

Our programs allow participants to collect your hard-to-recycle products and packaging.

1

The TerraCycle solution

Recycle

TerraCycle recycles the collected waste into a new material.

(Option to get recycled products made from the waste you recycle)



Collect



Zero Waste Box | Easy to launch solution

TerraCycle's Zero Waste Boxes provide a simple and streamlined recycling solution to collect in offices, stores, production facilities, labs, clinics, and more.

Distribute



Collect



Ship



Recycle



A. TerraCycle can distribute Zero Waste Boxes to each participating location.

B. TerraCycle can ship Zero Waste Boxes in bulk to a central location.

Participating locations collect waste using the Zero Waste Boxes.

Once ready, participating locations seal the box and ship to TerraCycle using the pre-affixed pre-paid shipping labels.

TerraCycle receives the shipments and recycles your products into new materials.



TerraCycle standard Zero Waste Boxes

TerraCycle has Zero Waste Boxes in stock that are ready to ship.





Recycle



TerraCycle employee examining bails of flexible film



TerraCycle’s purpose is to recycle what traditional recyclers do not

TerraCycle can legally guarantee that the materials we collect will be recycled because we charge the actual cost of collecting and processing into uniform new materials, crediting what those materials are sold for.

What makes TerraCycle a unique recycling service provider?

Audited and transparent



TerraCycle both conducts annual 3rd party audits with Bureau Veritas and provides the right to audit to all our clients directly in our contracts.

Recycling guarantee



TerraCycle grants a legal guarantee that your waste will be recycled.

Flexibility on raw material



Partners can direct their recycled raw materials however they wish.

Audited and transparent

Clients can visit our facilities and watch the recycling process in action, providing transparency - and confidence - that their material is accounted for and recycled.



TerraCycle team performing an audit with our partners in France.

Voluntary 3rd party audits

Bureau Veritas conducts annual audits of TerraCycle across all countries of operation for material collection and recycling certifications.



“*Bureau Veritas has determined that TerraCycle’s operations fully conform TCMCRS standard (Version 4.1). I believe that TerraCycle’s dedication to developing an auditable standard that promotes transparency in the supply chain continues to demonstrate that they are a leader in the recycling industry”*
Chuck Rogers, Director Bureau Veritas”

Partner audits

TerraCycle’s partners are entitled to visit our facilities to audit our operations directly or via third party. We have never failed an audit.

Additionally, TerraCycle’s Operations and Material Solutions team runs customized waste audits, reporting detailed criteria on collected and recycled waste.



Recycling guarantee

TerraCycle can legally guarantee that the materials it collects will be recycled because we charge the actual cost of collecting, processing into uniform new materials, crediting what those materials are sold for.



Traditional recycler

A traditional recycler's goal is to mine waste for value vs. recycling everything that is collected.

For example, in the case of paper waste, once locally collected this material is sorted at a MRF (municipal recovery facility) where it is baled and sold to a paper mill (the "recycler").

The paper mill will take what they like from that bale and use it to create a new fiber. Everything else will be landfilled or incinerated. The paper mill has no legal obligation to recycle.

In such supply chains, the MRF and recycler only focus on recycling what they can profitably recycle, and as a result, do not guarantee everything will be recycled.



TerraCycle

TerraCycle's purpose is to recycle everything that a program is designed to collect.

TerraCycle can legally guarantee that the materials it collects will be recycled because we charge the actual cost of collecting, processing into uniform new materials, crediting what those materials are sold for.

By ensuring the full costs are covered, TerraCycle can contractually guarantee that these materials will be recycled.

TerraCycle shares recycling certificates to ensure full traceability on the material collected and recycled.

TerraCycle's life cycle assessment (LCA) process

TerraCycle collection and recycling of rigid plastic waste streams reduce the overall environmental impacts by an average of 73% compared to traditional landfill & 67% compared to waste to energy models.

LCA information for other waste streams is available upon request.



SimaPro

Tools

TerraCycle LCAs are modeled using SimaPro® LCA software by Prè consultants. As part of the SimaPro platform, TerraCycle has access to many global databases like Ecoinvent, IDEA, DATASMART, and more.



Standards

TerraCycle makes best effort to conduct LCAs according to the ISO standards ISO14040 and 14044. Our LCAs are one-of-a-kind and require careful consideration of scope, allocation methods and other details.



Consultation

TerraCycle works with an external consultant Long Trail Sustainability (www.ltsexperts.com) to review the ISO compliance and validate our LCAs.

How TerraCycle recycles waste



01

Receive

TerraCycle receives waste in our Materials Recovery Facilities (MRFs). TerraCycle operates dozens of MRFs in 21 countries and handles thousands of different waste streams.



02

Check in

TerraCycle checks in, weighs, inspects materials for compliance, and records all shipments. Key shipment data is shared with brand partners in regular reports.



03

Aggregate

Shipment contents are aggregated and stored with similar materials until minimum processing quantities are met.



04

Recycle

TerraCycle works with strategic partners to process individual waste streams into a secondary raw material. Secondary raw materials can be used to make new products or can be used in your own supply chain.

Recycling process videos



Kroger Our Brands [Watch now](#)

TerraCycle and Retail partners jointly develop short videos showing how their waste collected by their customers is recycled out-of-store or in-store

By sharing these videos, Retailers drive education and awareness of the Recycling Program to increase engagement of their customers to collect and recycle.



How TerraCycle recycles beauty waste
[Watch now](#)



How do we recycle your rubbish?
[Watch now](#)



Santa Fe Natural Tobacco Company
[Watch now](#)



RipCurl
[Watch now](#)



Monoprix
[Watch now](#)



Subaru Loves the Earth
[Watch now](#)



and many more...

How TerraCycle recycles beauty waste



[Click to watch](#)