

Construction & Demolition Materials Research Project

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This project is supported by the St. Louis-Jefferson Solid Waste Management District and the Missouri Department of Natural Resources.



Slam Dunk Recycling

In St. Louis, it's fairly easy and common to recycle:

- Carpet
- Ceiling tiles
- Clean concrete
- Clean wood
- Roof shingles
- Scrap metal
- Yard waste



* Typical recovery value



Study Overview

However, there are still a lot of C&D materials going to the landfills not being recycled or reused, as they are either contaminated or difficult to process

Goal: To explore recycling and higher-use solutions for materials that have proven to be difficult to recycle in the St. Louis region.



The Problem

Through two USGBC C&D focus groups in 2011 with members of the local construction industry and a follow-up survey in 2012, the most difficult construction materials to recycle in St. Louis were determined to be:

- Drywall
- Concrete
- Wood
- Brick (Crushed or 3-hole)
- Paint
- Plastic Wrap - LDPE #4 (stretchy, soft) or PP #5 (crinkly)
- Plastic Fencing - PVC #3
- Plastic Banding - PET #1
- Plastic Buckets - PET #1 , HDPE #2 , or PVC #3



Study Overview

This study includes the following for each material:

1. **DEFINITION** of material
2. **REUSE** – List of reuse alternatives
3. **RECYCLING** – List of recycling options
4. **LOCAL RECYCLERS** – Company name, condition they accept, fees, pricing, website
5. **NATIONAL BEST PRACTICES** – Examples of the best recycling practices nationally
6. **RESOURCES** – General resources with related recycling info

Study can be found online at www.usgbc-mogateway.org/



Drywall

CHALLENGE:

- Constructed before 1979 - likely contaminated with asbestos or lead
- No known process to remove in a cost-effective way
- Grinding may lead to air contamination and health risk

REUSE: Reused Drywall

RECYCLING: Animal bedding, compost, crop nutrients, new drywall, portland cement, water treatment



Concrete

CHALLENGE:

- Paint contamination
- Embedded structural elements (rebar)

REUSE: Due to its necessary destruction during dismantling, it is not possible to reuse concrete as-is

RECYCLING: Building foundation, drainage, portland cement, road base, structural fill



Wood

CHALLENGE:

- If treated (paint, stain, heavy-metal-laden chemicals), cannot be burned or mulched
- Clean wood may contain nails or other fasteners

REUSE: General lumber, specialty wood species, vintage, or recovered

RECYCLING: Animal bedding, compost or mulch, down-cycled wood, products, industrial fuel source, landfill cover



Brick (crushed and 3-hole)

CHALLENGE:

- Different grades of brick have varied demand
- Broken bricks cannot be reused
- 3-hole bricks are fragile and crumble during recovery

REUSE: Whole bricks – intact 3-hole bricks can be reused

RECYCLING: Asphalt, concrete, exterior fill, outdoor pavers, roadway sub-base



Paint

CHALLENGE:

- Most common finishing treatments used to protect indoor and outdoor surfaces and provide color

REUSE: Reusable paints of the same color can be mixed, tested, adjusted, and resold

RECYCLING: Cement additive – an ingredient in the manufacture of cement



Plastic Wrap – LDPE #4 (stretchy, soft) or PP #5 (crinkly)

CHALLENGE:

- #4 LDPE (Low Density Polyethylene) used in bags, siding, tiles, shipping totes, clamshell packaging and wrapping pallets
- #5 PP (Polypropylene) has good resistance to heat, used for flexible and rigid packaging, film, textiles, and containers

REUSE: Plastic wrap can be reused as long as structural integrity is maintained.

RECYCLING: Binder in asphalt concrete



Plastic Fencing - PVC #3

CHALLENGE:

- Polyvinyl Chloride (PVC) - pipes, bottles, upholstery, and autos
Industrial, agricultural, and demolition of buildings generates most PVC waste

REUSE: PVC fencing

RECYCLING: Any fencing with a #3 stamp can be recycled at participating recycling facilities.



Plastic Banding - PET #1

CHALLENGE:

- #1 PET (or PETE, Polyethylene Teraphthalate) - soft drink containers and other rigid containers
- May be contaminated by metal clips and/or staples
- May bind bailing machines

REUSE: Plastic banding – can be reused as long as structural integrity is maintained

RECYCLING: Unless contaminated by, plastic banding is easily recyclable into carpet, clothing, textile, and polyester fiber fill



Plastic Buckets - PET #1, HDPE #2, or PVC #3

CHALLENGE:

- High Density Polyethylene (HDPE) – used in milk jugs, detergent bottles, plastic lumber, and construction buckets
- High levels of contamination

REUSE: Plastic Buckets - reused

RECYCLING: Currently most cost effective to recycle internationally



Economic Opportunity - Drywall

LOCAL:

Company	Condition	Drop-off Fee	Pick-up Fee	Re-sale Product	Re-Sale Pricing	Website
Eco Recycling, Inc.	Clean only	\$75/ton	Will bid	Base material	Call for pricing	http://ecorecyclinginc.com
Habitat for Humanity-St. Louis ReStore	Clean, whole sheets only	Free	N/A	Used drywall	Varies	http://www.habitatstl.org/supportus/restore/
Hansen's Tree Service	Clean only	\$7/yard	Will bid	Compost ingredient	\$23/yard (compost)	http://www.hansentree.com/
Composting	Clean only	\$35-45/load	Will bid	Compost ingredient	\$18-39/ yard (compost)	http://www.stlcompost.com/

NATIONAL BEST PRACTICES:

Lafarge gypsum plant in Buchanan, NY, is completing an upgrade that will allow their drywall product to exceed 99% recycled content



Economic Opportunity - Concrete

LOCAL:

Company	Condition	Drop-off Fee	Pick-up Fee	Re-sale Product	Re-Sale Pricing	Website
Eco Recycling	Clean only	\$75/ton	Will bid	Base material	Call for pricing	http://ecorecyclinginc.com

NATIONAL BEST PRACTICES:

Recycled Material Company recycles concrete and asphalt into aggregate products, such as road base, pipe bedding, structural backfill, landscape stone, drainage rock, and soil amendment.

Stapleton International Airport in Denver, CO recycled 6.5 M tons and created an “urban quarry” for public construction projects.



Economic Opportunity- Wood

LOCAL:

Company	Condition	Drop-off Fee	Pick-up Fee	Re-sale Product	Re-Sale Pricing	Website
Eco Recycling	Clean only	\$75/ton	Will bid	Base material	Call for pricing	http://ecorecyclinginc.com
Habitat for Humanity-St, Louis ReStore	Clean lumber only	Free	N/A	Used drywall	Varies	http://www.habitatstl.org/supportus/restore/
Hansen's Tree Service	Clean only	\$7/yard	Will bid	Compost ingredient	\$23/yard (compost)	http://www.hansenstree.com/
PLM, Inc.	Pallets only	WILL PAY \$0.50-\$4.50 per pallet	Will bid	Refurbished pallets	\$37.50 and up	http://www.plmgt.com/
Composting	Clean only	\$35-45/load	Will bid	Compost ingredient	\$18-39/ yard (compost)	http://www.stlcompost.com/

NATIONAL BEST PRACTICES:

Wood to Liquid, a liquefaction process that recycles all woods, treated and painted, being studied at the LSU Agricultural Center's Calhoun Research Station.



Economic Opportunity - Brick

LOCAL:

Company	Condition	Drop-off Fee	Pick-up Fee	Re-sale Product	Re-Sale Pricing	Website
Habitat for Humanity- St. Louis ReStore	Whole 3-hole bricks only, depending on need	Free	N/A	Used bricks	Varies	http://www.habitatstl.org/supportus/restore/

NATIONAL BEST PRACTICES:

Interstate Brick manufactures bricks from 100% post- and pre-consumer brick.



Economic Opportunity - Paint

LOCAL:

Company	Condition	Drop-off Fee	Pick-up Fee	Re-sale Product	Re-Sale Pricing	Website
Earthbound Recycling	Full or partial cans	\$0.25/lb	N/A	Used paint	Free (for global charities)	http://www.earthboundrecycling.com/
Habitat for Humanity- St. Louis ReStore	Full cans only	Free	N/A	Used paint	Varies	http://www.habitatstl.org/supportus/restore/

NATIONAL BEST PRACTICES:

Global Paint for Charity collects leftover paint from both residential households and commercial businesses nationwide and uses it for global housing rehabilitation projects.



Economic Opportunity - Plastic Wrap LDPE #4 (stretchy, soft) or PP #5 (crinkly)

LOCAL:

Company	Condition	Drop-off Fee	Pick-up Fee	Re-sale Product	Re-Sale Pricing	Website
Eco Recycling	#4 only	\$75/ton	Will bid	N/A	Varies	http://ecorecyclinginc.com
PLM, Inc.	#4 and #5		Will bid			http://www.plmgt.com/

NATIONAL BEST PRACTICES:

Baled LDPE and PP should not be stored outdoors in weather and sunlight for over a month to prevent damaging the commodity.



Economic Opportunity – Plastic Fencing PVC #3

LOCAL:

Company	Condition	Drop-off Fee	Pick-up Fee	Re-sale Product	Re-Sale Pricing	Website
Eco Recycling		\$75/ton	Will bid	N/A	Varies	http://ecorecyclinginc.com

NATIONAL BEST PRACTICES:

N/A



Economic Opportunity – Plastic Banding PET #1

LOCAL:

Company	Condition	Drop-off Fee	Pick-up Fee	Re-sale Product	Re-Sale Pricing	Website
PLM, Inc.	Truckload only, chopped or baled	varies	Will bid	Sold to recyclers	Market price	http://www.plmgt.com/

NATIONAL BEST PRACTICES:

N/A



Economic Opportunity - Plastic Buckets

PET #1, HDPE #2, or PVC #3

LOCAL:

Company	Condition	Drop-off Fee	Pick-up Fee	Re-sale Product	Re-Sale Pricing	Website
Earthbound Recycling		\$0.25/lb	N/A	Used buckets	Free	http://www.earthboundrecycling.com/
Eco Recycling	Mostly clean	\$75/ton	Will bid	Broker sells out of country	~\$30/ton	http://ecorecyclinginc.com
Habitat for Humanity-STL ReStore		Free	N/A			http://www.habitatstl.org/supportus/restore/
PLM, Inc.			Will bid			http://www.plmgt.com/

NATIONAL BEST PRACTICES:

N/A



Summary

	Brick - Crushed	Brick - 3 Hole	Concrete - Clean	Drywall - Clean	Wood - Clean	Paint Cans - Full	Paint Cans - Partial	Plastic Banding - PET #1	Plastic Buckets - PET#1, HDPE#2, PVC#3	Plastic Fencing - PVC #3	Plastic Wrap - LDPE #4	Plastic Wrap PP #5
Baden, Inc.										X		
Earthbound Recycling						X	X		#1			
Eco Recycling, Inc.			X	X	X				X	X	X	
Habitat for Humanity-St. Louis ReStore		X		X	X	X			X			
Hansen's Tree Service				X	X							
PLM, Inc					X			X	X		X	X
Republic Services										X	X	
St. Louis Composting				X	X							



Conclusion

There is a lot being done now that is economically viable and effective in our fast-paced and competitive commercial markets

Eco Recycling clearly stands out as a significant resource in this region that should be promoted as a model for others.

There is clear monetary value for even the most challenging commercial construction materials in our region – the subject of this study. Even though it is still cheap and easy to simply send materials to our landfills, recycling and reuse is now being managed at a truly competitive rate.

Unique market opportunity exists for local processing and recycling of:

- Contaminated drywall, concrete, and wood
- Jobsite plastics



Note: Mandate Coming Soon!

New Mandatory Green Construction Practices for the Federal Sector
Executive Order 13514: Minimizing the generation of waste and pollutants
through source
reduction by:

- (iii) diverting at least 50 percent of construction and demolition materials and debris by the end of **fiscal year 2015**;
- (iv) reducing printing paper use and acquiring uncoated printing and writing paper containing at least 30 percent postconsumer fiber;
- (v) reducing and minimizing the quantity of toxic and hazardous chemicals and materials acquired, used, or disposed of;
- (vi) increasing diversion of compostable and organic material from the waste stream



Best Practices for On-Site Recycling

Benefits include operational savings, easy LEED points

PRO TIPS:

1. Source separate materials!! Reduces contamination, maximizes recovery rates.
Comingled (~50% salvaged) vs. Separated (~75 salvaged)
2. Write diversion rates into bid specs for contractors

RESOURCES/DOWNLOADS: <http://www.materialmix.com/wiki>

- Volume-to-weight conversion table
- Tips to maximizing value
- LEED credits related to waste diversion
- Waste Management Plan template
- **C&D Toolkit:** constructionwaste.wordpress.com/



Q&A

How many of you have been involved in a project that recycled materials?

How many of you have seen cost savings?

